GOVERNMENT OF INDIA
MINISTRY OF IRRIGATION

REPORT OF THE WORKING GROUP ON MAJOR & MEDIUM IRRIGATION FOR SEVENTH PLAN 1985-90

NEW DELHI
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M.G. PADHYE
(Tel 383098)

D.O.No.86/Secy(I)/84

Government of India
Ministry of Irrigation

18th Oct. 1984
23rd

Dear Shri Ramanathan,

The Planning Commission constituted a Working Group to formulate the draft Seventh Five Year Plan 1985-90 for Major and Medium Irrigation Programme. The Working Group was required to formulate its report by 31st January 1984. However for various reasons this had not been possible. I now forward herewith the report of the Working Group for your perusal and further disposal.

The membership of the Working Group was indicated in the letter of creation of the Working Group. However, during the course of discussions we co-opted a number of members. The Member-Secretary of the Working Group also held discussions with the State Representatives. It was however seen that the States' had not prepared their excercise for the Seventh Plan and what has been now presented is based largely on their need rather than the resources.

Four meetings of the Working Group were held and the details in the report as well as the various problems and future perspectives were discussed to consider all details. On the basis of these discussions the Seventh Plan proposals have been framed.

At the time of formulating the VI Plan it was decided that the objective of Major and Medium Irrigation Programme should be to achieve the potential of 58.5 m.ha. by 2005 - 2010 A.D. The Working Group had kept these desirable objectives in view and have prepared a report for achieving about 6.5 m.ha. during the Seventh Plan. If resources for this are made available it would be possible to achieve this. It is expected that by the end of VI Plan a balance potential of 27.5 m.ha. would remain untapped. At the rate of 1.25 million ha. per year use it should be possible to achieve the full potential under this programme by 2010 A.D. If resources are no constraints it would be possible to accelerate this programme.

For the Seventh Five Year Plan the Working Group has fixed a target of a potential of 6.5 m.ha. which will require an outlay of about Rs.22450 crores. The broad strategy for VII Plan would be:

i) Completion of ongoing projects started prior to 1.4.1974.

ii) Provision of full outlays for medium projects undertaken upto the end of Sixth Plan.

iii) Acceleration or completion of major projects of 5th Plan and Annual Plan 1978-80 during the Seventh Plan.

iv) Commitments for outlays required for externally assisted projects.

v) Provision of adequate funds for strengthening of any investigation and design agencies, as necessary during the 7th Plan.

vi) Provision for continuation of projects taken up during the VI Plan commensurate with the targets for completion.

vii) Provision of necessary funds for modernisation of schemes.

During the review of ongoing project costs it was seen that the spill-over costs of all the ongoing projects was of the order of Rs.26,400 crores. These costs represent the approximately updated costs of the projects to 1984-85 level as realistically updated costs were not available with the States. Against this the plan provide for Rs.22450 crores. This will mean some of the ongoing projects will spillover the eighth plan. It is also necessary to realise that since these are based on fixed prices, annual allocation to be provided year by year will have to take into consideration the escalation that may be expected to take place so that there is no erosion of real allocation for this sector.

With the increase in the tempo in irrigation sector it will be necessary to strengthen the Central agencies and such a strengthening has to be looked into with the perspective of development of irrigation in the States, the problems that this sector may have to face and the assistance that the Central agencies may have to render consistent with the technological updating that may have to be done. With this in view it has been projected to provide an outlay of about Rs.912 crores in the Central Sector. This covers activities of the organisations such as Central Water Commission, Central Water and Power Research Station, Central Soil and Materials Research Station, National Institute of Hydrology, Sone River Commission, Central Board of Irrigation and Power. P.P. Cell (Narmada) and National Water Development Agency.

In all these developmental aspects, some policy issues arise on which decisions may have to be taken by the Centre. Some of these important policy issues have been listed in Chapter 16. This would need your attention.

As stressed quite often, there is need to provide adequate outlays for maintenance and repairs of the existing systems as well as for O&M establishment. Though this is a question related to the non-plan resources of the States, Planning Commission will have to ensure that States provide these at the rates needed for adequate O&M operations. We feel that the recommendations made by the 8th Finance Commission are not adequate. This also brings up the question of increase of the water rates for irrigation so that they generate the necessary resources for O&M.Concerted efforts may have to be done at the Government of India level to persuade the States to raise the water rates. The need to increase productivity and reduce the lag in utilisation is easily realised. The Working Group feels that the present system of CAD should be extended to cover all major and medium projects.

As I forward this report, I hope the recommendations contained therein will be useful in the overall planning of irrigation development of the country.

With regards,

Yours faithfully,

Sd/-
(M.G. PADHYE)
Secretary
Ministry of Irrigation
Government of India

Shri KV Ramanathan
Secretary, Planning Commission,
Yojna Bhavan, New Delhi.

P R E F A C E

India with its vast surface and ground water resources, needs an organised and scientific approach to development of its water resources. This was realised a long time ago and efforts had been made to construct water resources projects across vast rivers to harness them for irrigation.

A sustained and systematic programme for development of irrigation facilities in the country was taken up with the start of planned development in 1951. Irrigation programmes were accorded high priority. There has been progressive increase in the irrigation potential created as a result of taking up a large number of projects major as well as medium during the various plan periods. The ultimate potential of the country through major and medium irrigation schemes has been assessed at present as 58.5 M.ha. A potential of 9.7 M.ha. or about 16% had been created prior to I Plan. Till the beginning of the VI Plan a potential of 26.5 M.ha. forming 45.5% of the assessed potential was created. However the Government of India's objective of creating the entire irrigation potential of the country by the turn of the century requires a spurt in the activities pertaining to major and medium irrigation programme.

It has been possible to attain an annual rate of creation of additional potential of about 0.9 to 1 M.ha. It is now proposed to increase it to about 1.3 M.ha. per year during the VII Plan. Although the States have indicated that they can create a potential of about 8 M.ha., the Working Group is of the view that in the light of the past experience we can only expect a target of 6.5 M.ha. in the VII Five Year Plan Period. The cost required for achieving this would be about Rs.21537 crores in the States sector. This would be supplemented with Rs.912 crores in the Central sector, totalling the Seventh Plan Outlay to Rs.22449 crores. The State-wise outlays and targets and the proposals for Central Sector recommended by the Working Group can be seen in Annexure XVIII to the report. However, due to further enormous increase in costs this may not be sufficient as many of the estimates of projects require further updating. It is expected that the recommendations of the Working Group are provided in full as a minimum as otherwise it is likely that the physical achievement and consequently productivity will also suffer.

It may be recalled that the target of food production for VII Plan is 190 M. tonnes. The report has also taken note of the necessity of consolidation of gains from previous plans and it has been the endeavour of the Group to provide specific outlays for construction of field channels and water courses.

The preparation of this report was a cooperative effort of all the members of the Working Group. The Secretary, Central Board of Irrigation and Power has helped in the preparation of the chapter on Science and Technology. The officers and staff of the Planning and Progress Wing of the Central Water Commission have assisted in the discussion with the State's Governments and compiling the material. The Working Group acknowledges with thanks the cooperation and assistance rendered by all of them.

(GOKHUL PRASAD)
Member (P&P), Central Water Commission
Ex-officio Additional Secretary,
Government of India

Convenor, Working Group on Major and Medium Irrigation for Seventh Plan (1985-90)

C O N T E N T S

CHAPTER I

INTRODUCTION

1.0. The Planning Commission on 16th July, 1983 constituted a Working Group of 22 members under the chairmanship of Secretary, Ministry of Irrigation and with Member (P&P), CWC as convenor, to formulate the Draft Seventh Five Year Plan 1985-90 for major and medium irrigation programme. Subsequently, 11 more members were coopted into the Working Group. The terms of reference issued by the Planning Commission and the full composition of the Working group are given in Annexure I.

Terms of reference briefly relate to:

i) State-wise review of the Sixth Plan performance.

ii) Seventh Plan proposals for the States and Central sector in physical and financial terms.

iii) Measures for ensuring adequate outlays by each of the States concerned for inter-state projects.

iv) Drawing up State-wise master plans.

v) A Science and Technology Plan for the sector.

vi) Compliance with the Public Accounts Committee's recommendation.

vii) Strategy for improving the quality of existing irrigation systems.

viii) Minimising conveyance losses.

ix) Strategies for implementation of the Plan on the basis of malady-remedy analysis.

x) Reducing the financial losses incurred by the irrigation works.

xi) Additional employment during construction and operation etc.

The Working Group held 4 meetings on 30th August, 1983 and 21st January, 1984, 16th June, 1984 and 26th July, 1984. The State-wise discussions were also held by the Convenor of the Working Group viz. Member (P&P), CWC and Additional Secretary to the Government of India with representatives of the State Governments

during February-March, 1984 to discuss the State Government's Plan and strategies. As the State Plans are in the preliminary stages of formulation in the absence of firm commitments of resources by State Planning Boards, Planning and Finance Departments etc. the outlays were not clearly known.

In public planning system, there are three levels of Planning viz., policy planning, strategy planning and operational planning. Policy planning at the highest level involves goal setting and formulation of broad strategies. At this level goals tend to be idealistic and long range in terms of duration. Strategic planning entails comparative evaluation of alternative options (strategy), preparation of decision agenda and allocation of resources. Strategic planning is done within the goals established by the executive branch and approved by the legislative body. It is primarily the concern of the top administrative branch. Decending downward in the planning hierarchy, the operational level of planning is handled almost exclusively by the managers who are closest to the work of agencies. The main emphasis in operational planning revolves around specific objectives and schedules being developed to meet short term requirements.

In this broad concept of three levels of planning the task force constituted by the Planning Commission could be categorised as the one involved with the strategic planning in the field of irrigation. Its function involves allocation of resources within the goals set at the policy planning level. It should also act as the link between the higher level of policy planning and the lower level of operational planning.

The Planning Commission has recently issued its approach to the Seventh Five Year Plan 1985-90 in which the aspects of Agriculture Development and Irrigation have been spelt out; besides the objectives of the Seventh Plan. The goals of Planning have essentially remained the same since the First Five Year Plan. Broadly speaking, these goals have included growth with social justice, self reliance, increasing level of employment, reducing poverty etc. Within these broad objectives, the emphasis has shifted from Plan to Plan. The essential goals of the Seventh Plan are basically similar to and in continuation with those set during the earlier Plans. In respect of irrigation programme the specific objective of creating irrigation facility is to increase the agricultural production to feed the increasing population which may be expected to reach a figure of 950-1000 million by 2,000 A.D. Towards this end the broad objective of irrigation programme would be to make the necessary irrigation facility available within a reasonable period.

The major and medium irrigation forms an important component in development. During the Sixth Plan, about 17 per cent of the State Sector outlay was diverted towards this sector. The manipulation of this important programme towards the achievement of the above planning goals is a part of the task before the working group.

CHAPTER 2

REVIEW OF PERFORMANCE OF THE SIXTH PLAN

2.0 The Sixth Plan envisages an outlay of Rs. 8301.36 crores in the major and medium irrigation sector for creating an additional potential of 5.74 million ha. and a corresponding utilisation of 5.6 million ha. The outlays were distributed between ongoing schemes, new schemes, modernisation etc., as follows:

	Rs. Crores	Percentage	Pot. (M.ha.)	Ult. (M.ha.)
On-going Schemes	6073.64	73.16	5.418	
New Schemes	1070.17	12.89	0.10	
Modernisation	720.03	8.67	0.225	
Water Development	437.52	5.27		
Total envisaged outlay (1980-85)	8301.36	100	5.74	5.6
Central Sector	90.00	1.07		
	8391.36			

However, the expenditure and progress during the Sixth Plan are likely to fall short of the original allocation and are anticipated to be as follows:

Rs. Crores/M.ha.

	Expenditure	Potential	Utilisation
1980-81	1211.16	0.806	0.503
1981-82	1357.21	0.873	0.535
1982-83	1510.04	0.916	0.725
1983-84	1700.59 (antcd.)	0.901	0.976 (antcd.)
1984-85	1834.30	0.851	0.887 (target)
Total:	7613.30	4.347	3.620

The distribution of expenditure is likely to be as under:

	Expnd. Percentage
On-going schemes	80.4
New Schemes	9.1
Modernisation	6.0
Water development, etc.	4.5
Total expenditure (80-85)	100.00

It is seen above that the main shortfall in expenditure has been in the new schemes and Modernisation Projects. The proportionate share of ongoing schemes have actually gone up in the allocation of actual outlays.

The slippage in outlay is Rs. 776.05 crores or 9.24%. The slippage in irrigation potential is 1.30 M.ha. or 22.26%. Statewise programme in this regard is shown in Annexure-II.

Although the outlays themselves have been reduced by about 7.3% over the outlays originally envisaged at the time of Sixth Plan formulation, the Working Group examined the reasons for their apparent slippages. It was found that when the outlays and physical targets were fixed at the time of formulation of Sixth Plan, projection of financial requirements were made on the basis of prices prevailing at that time, and no allowance was made for likely escalation in future. Consequently, there was shortage of funds in terms of real value of money available. Taking these aspects into account, the Irrigation Ministry made a proposal for an additional plan outlay of Rs. 2500 crores so as to make good the deficiency and achieve the physical targets set for the plan. Owing to financial constraints, this however did not materialise in full. However in view of special circumstances Rajasthan Project was provided an additional outlay of Rs. 15 crores each during 1982-83 and 1983-84 and Teesta Project was provided Rs. 5 crores during 1983-84.

The Mid Term Appraisal of the Sixth Plan has brought forth the point of inadequacy of funds. The Appraisal has pointed out with respect to major and medium sector that "If Additional Funds cannot be provided, the result could be that the available funds for the irrigation programme during the plan period would, in real terms, be much less than the plan provision. Therefore, the target of 5.7 m.ha. additional irrigation potential during the Sixth Plan is unlikely to be achieved". The present assessment is that it will be possible to create through major and medium irrigation programme a potential of around 4.5 m.ha. a short-fall of about 23% whereas the physical dimunition of funds coupled with escalation effect would have pushed it down even lower (easily by 25%). As the appraisal itself has pointed there is little scope for adjustment within the sector since already more than 82% of the outlays are being utilised for ongoing projects to enable their early completion.

The cumulative potential created through major, medium and minor irrigation schemes during the several plans have been as follows:

M.ha.

	Major & Medium	Minor	Total
Ultimate Irrigation potential	58.5	54.5	113.0
Potential during pre-Plan periods	9.7	12.9	22.6
Potential during Plan period 1950-80			
I Plan 1951-56	2.5	0.7	3.2
II Plan 1956-61	2.1	2.2	4.3
III Plan	2.3	2.0	4.3
Annual Plans 1966-69	1.5	4.5	6.0
IV Plan	2.6	3.8	6.4
V Plan 1974-78	4.1	2.7	6.8
Annual Plans 1978-80	1.7	1.4	3.1
Total:	16.8	17.3	34.1

It will be seen that while during the period prior to V Plan, the average growth of irrigation potential has been at the rate of 0.53 M.ha.pe year, during the V Plan and Annual Plans 1978-80, the average growth rate was about 1.0 M.ha. per year. During the Sixth Plan, the growth has been at the rate of 0.9 M.ha. per year

Apart from rise in cost shortfalls could be attributed to the proliferation of projects resulting in thin spread of resources. It was seen that a large number of major and medium projects were taken up and ongoing during the different Plans as follows:-

	Major	Medium
I Plan 1951-56	25	211
II Plan 1956-61	22	115
III Plan 1961-66	28	74
Annual Plans 1966-69	11	37
IV Plan 1969-74	31	104
V Plan 1974-78	73	375
Annual Plans 1978-80	15	-
Total	205	916

Out of total of 205 major and 916 medium projects taken up prior to the beginning of the VI Plan, 29 major and 469 medium projects were completed in all respects prior to 1980. When the Sixth Plan started, there were accordingly 176 major and 447 medium ongoing schemes spilling over from previous Plans. Among the major projects, there were 11 from the I Plan, 13 from the II Plan, 24 from the III Plan, 10 from Annual Plans of 1966-69, 30 from IV Plan and the remaining 88 from the V Plan and Annual Plans 1978-80. List of the major projects is shown in Annexure III.

In spite of having a large number of pending projects already in hand the States proposed 115 major and 265 medium projects to be started during Sixth Plan as new projects of VI Plan.

When the Sixth Plan was first discussed in 1980, the latest estimated cost, spillover etc. of ongoing schemes were as follows:

Ongoing Schemes	Rs. Crores
Estimated cost	20623
Exp. upto March, 1980	11598
Spillover cost	9025
Outlay proposed for VI Plan	6074

When the Annual Plan 1984-85 was discussed in 1983, the latest estimated cost was indicated by the States as Rs. 24667 crores, an increase of Rs. 4144 crores in a 3 year period. During this 3 year period only Rs. 3507 crores was spent on ongoing schemes. This can be partly attributed to escalation. It seems the situation outlined in the Naegamwala Committee report (1972) still persists. It is also seen that the States have not revised all the estimates during this interval between 1980 and 1983 Annual Plan discussions. The increased costs could be even more, if all the estimates are revised upto date.

When the Fifth Plan started in 1974, the number of ongoing schemes was about 75 major and 155 medium. Their total estimated cost was of the order of Rs. 4842 crores, their ultimate potential 14.58 m.ha., their spillover into 5th Plan Rs. 2902 crores and their balance potential 9.53 M.ha. During the Fifth Plan, a large number of additional major and medium schemes were taken up, whose total estimated cost at that time is not available. The detailed project reports for most of the schemes were not prepared at that time. In some cases even the schemes were merely identified. Without full technical details however Rs. 1027 crores were earmarked for new schemes out of the total V Plan outlay of Rs. 2401 crores.

Rs. Crores/M.ha.

Fifth Plan	Esti. cost	Ult. pot.	Spill-over cost	Spillover pot.	Outlay proposed
Ongoing Schemes					
About 75 major and 115 medium	4842	14.58	2902	9.53	1231
New Schemes					
About 100 major and 300 medium	N.A.	11.00 (about)	N.A.	11.00 (about)	1027
Total		25.58	2902@	20.53	2401*

*Includes Water Development
@Excluding New Schemes.

Source: Material supplied to the Estimates Committee in 1976

In Seventh Plan formulation it is necessary to take cognisance of all the above.

2.1 EXTERNAL ASSISTANCE

The special feature of the irrigation development during VI Plan has been, assistance received from World Bank and other external agencies like USAID, IFAD, the Ford Foundation, UNDP, etc. for major and medium projects, C.A.D. and other minor projects. Assistance agreements with the World Bank alone covers $ 221 million for major and medium irrigation, against which reimbursement of $ 943.8 million has so far been made.

World Bank Assistance is at present received as per 18 agreements entered by Government of India for Major and Medium Projects. Some of these agreements are for a group of projects. Some were only medium projects like Gujarat medium, Madhya Pradesh medium etc. In view of the commitments made for these projects with an external agency Plan gives priority to these aided projects in resource allocation. The Project also receive close attention at all levels and the outlays on World Bank Projects are indicated in earmarked outlays by the Planning Commission. The following figures of expenditure will indicate the relative importance received by the World Bank assisted projects in comparison to other projects in respect of ongoing projects. Besides ongoing projects, additional expenditure is incurred on new projects, modernisation schemes and for ancillaries like investigation, research etc.

The following table gives total expenditure, annual expenditure qualifying for World Bank Assistance and the reimbursement during the first four years of the VI Plan:

Rs. crores

	Total exp. on programme	Exp. on portion qualifying for W.B. Assistance	Reimbursement ($ million)
1980-81	1211.16	314.14	164.00
1981-82	1357.21	403.28	170.17
1982-83	1510.04	486.14	296.09
1983-84	1703.04	309.33*	105.44*
Total	5781.45	1512.89	735.78
Percentage over (1)	100%	25.58%	10.41%

*Information for most projects available only upto 9/83 and 12/83.

2.2. PERFORMANCE OF WORLD BANK PROJECTS IN RELATION TO OVERALL MAJOR AND MEDIUM IRRIGATION PROGRAMME

World Bank projects account for 32% of the estimated cost in relation to all ongoing projects in the VI Plan. However, they carry only 18.4% of the benefits. It would therefore appear that the projects formulated with the World Bank assistance are relatively costly due to their greater degree of sophistication.

It would also be seen that World Bank Projects take relatively more share of outlays, but immediate benefits are not proportionate. Some of this is attributed to the fact that the projects taken up in the programme are comparatively new. This undesscores the need to provide sustained outlays are needed during future years to obtain full benefits from these World Bank Projects.

The proportion of the project cost qualifying for World Bank assistance average 43.75% of the overall project costs.

The reimbursement comes to about 40.7% of the qualifying expenditure. However, it is only 31.8% of the total expenditure of the World Bank Project and 10.41% of the total major and medium irrigation programme of the country. List of projects receiving assistance during the VI Plan and those in the pipeline are given in Annexure V & VI.

2.3 TECHNICAL EXAMINATION OF PROJECTS

Irrigation being a State subject irrigation schemes are formulated, constructed, operated and maintained by the State Governments.

The Central Water Commission examines all major and medium irrigation schemes (i.e. all schemes having culturable command area of more than 2000 ha.) in accordance with the procedure laid down by the Planning Commission. The guidelines for preparation of detailed project report for irrigation and multipurpose projects have been formulated by the Ministry and circulated to all the State Governments for their guidance in preparation of project reports.

The project reports are technically examined in specialised directorates of Central Water Commission and other agencies (Departments in Central Government) After clearance of the various Departments and of Central Water Commission these are put up for consideration and acceptance by the Advisory Committee of the Planning Commission. The technical examination in CWC covers the aspect of technical feasibility and economic viability of schemes. The Advisory Committee accepts the schemes sometimes with certain observations/stipulations. After compliance of these observations by the State Governments and also of the other concerned departments like Environment, the Planning Commission accords final approval to the Projects.

During the Sixth Plan period so far (i.e. April, 1980 to April, 1984) CWC (TE Dte.) has received 382 new/revised (i.e. 187 major and 195 medium) irrigation schemes for technical clearance from CWC and Planning Commission. During the period, Planning Commission have accorded learance to 104 schemes (21 major and 83 medium irrigation schemes) for an estimated cost of about Rs. 550 crores.

About 133 major schemes and 83 medium schemes totalling 216 are currently at various stages of examination, in the CWC. The clearance of these schemes often gets delayed on account of inadequate investigation having been done by the project authorities. During the Irrigation Ministers Conference, it was impressed upon the States to associate Central Water Commission with projects costing more than Rs. 30 crores.

CHAPTER 3

RECOMMENDATIONS OF THE PUBLIC ACCOUNTS COMMITTEE

The Public Accounts Committee which examined the Planning process and monitoring mechanism in relation to irrigation projects relating to Ministry of Planning, finalised its report in April, 1983. The Committee recognised that irrigation is a state subject. However, in the context of the planned development of the country for which the Planning Commission is the initiator guide as well as monitor, the Committee proceeded to examine the subject with the sole objective of focussing the attention of Parliament and the public to the imperative need to streamline the planning process and the monitoring mechanism in this vital sector. Some of the important findings and conclusions relevant in the context of the formulation of the VII Plan of the Committee are dealt with in the following paras.

On the question of creating ultimate potential by the turn of the century, the Committee observed that the present growth rate was a little over 1 m.ha. per year and it needed to be stepped up. The Committee also felt that the share of irrigation in the total outlay of successive Plans has been about 10 per cent only and this needed considerable augmentation. The growth rate of irrigation potential proposed in the Working Group Report is 1.3 m.ha. per year. The share of irrigation in the Seventh Plan, according to the proposals would be 21.9 per cent.

The Committee has however noted that there were enormous cumulative losses from investment on irrigation. They felt that there was no reason for subsidising a section of rural population consisting of big land owners who were the principal beneficiaries of the irrigation facilities at the cost of the tax payers. The Committee has urged that this question should be thrashed out in the Conference of the Chief Ministers so that the oft repeated exhortations of the planners are translated into action without further loss time.

The Committee felt that top most priority should be given during the Sixth Plan for schemes undertaken during the first three plans and it should be ensured that these are completed without delay and without cost escalation. The Committee emphasised the need for exercising utmost restraint in starting work on new major and medium irrigation schemes without ensuring provision of sufficient funds, technical personnel and essential inputs like cement, steel, coal etc. to enable completion of the projects within the time schedule laid down and within the approved estimates. They also considered that any adhocism in project selection

could be a self-defeating exercise. It was also felt that the plan schemes and projects are so selected that returns (financial, economic and social utilisation of scare resources) are ensured consistent with the objectives of the plan.

The likely spillover cost of Rs. 4318 crores of the major projects started before the Fifth Plan, has been substantially provided for in the Seventh Plan. The method of two stage clearance of projects has also been included among the policy suggestions of the Working Group Report.

On the question of association of the Central Water Commission with the investigation and preparation of project reports on projects costing over Rs. 30 Crores, the Committee felt that Planning Commission should take up the matter once again with the State Governments at the highest level so that the steps taken will go a long way in strengthening the investigation machinery in the States.

Regarding preparation of master Plans, the Committee trusted that the State Governments would realise the desirability and urgency of preparing State Plans in the interest of orderly and phased development of the water resources. The expert assistance of the Central Water Commission should be made available to the States in this task in an increasing measure.

For water resource development, the Committee felt that it was extremely essential to have a well defined national water policy so as to provide for a balanced development of the water resources for hydel power generation and irrigation and their utilisation in the larger national interest. The Committee trusted that the National Water Resource Council proposed to be set up in persuance of the recommendations of the National Development Council would address itself to this task as a first priority. The Committee also felt that the recommendations of the irrigation commission would help in the formulation of national water policy.

About the projects cleared by the Central Water Commission, the Committee felt that due to inadequate infrastructure being provided by the States for investigation, etc. steps should be taken to improve the position so that the projects could be cleared within the period of one year by the Central Water Commission in future.

Appropriate recommendations in these regards have been made in the Policy Recommendations of the Working Group.

The Committee felt that the Central Water Commission which is entrusted with responsibility of monitoring the progress of 66 major irrigation projects must act as the local agency for coordinating the supply of scarce construction materials and ensure their smooth flow to the respective project areas.

The Central Water Commission is already functioning as the Coordinating body for regulating the supply of scarce construction materials like cement, steel, explosives etc. The existing arrangement, estimated requirement of the materials during the Seventh Plan and the proposed arrangement for the supply of them are indicated under Chapter 10.

Discussing the need to provide for the anticipated escalation in the Plan and considering the risk of generating the psychology of inflation involved in it, the Committee has viewed that the least that could be done in this regard was to update the estimates in time and make necessary provisions therefor from year to year. This aspect has been discussed in the policy recommendations of the Report under Chapter 4 and 16 and a proposal for time slicing of the projects during the five year plan period has been made.

Regarding the assessment of the actual economic returns of the irrigation projects, the Committee observed that there is no regular system for this at present. They recommended that evaluation of projects at five years interval should be carried out to find out to what extent the economic benefits envisaged in the project report has been actually realised and what steps should be taken to ensure optimum economic return. The recommendations of the Committee has been incorporated in the Policy recommendations of the Report.

The Committee has observed that huge capital is locked up in unutilised irrigation projects. They recommended that a determined and sustained effort needs to be put in for large scale modernisation and for efficient management of water resources. Consolidations of gains and removal of constraints in the optimum utilisation of the irrigation potential must get over-riding priority. In the proposals for the Seventh Plan, this aspect has been given considerable importance and an amount of Rs. 433 crores has been earmarked for this purpose.

The Committee has also recommended that for large interstate projects and state projects costing Rs. 50 crores or more, Central Boards should be set up and sufficient and adequate powers be delegated to these Boards as well as the Chief Engineers of the Projects in the interest of their speedy execution. Such aspects are to be looked into by the Centre and State Governments.

CHAPTER 4

APPROACH AND STRATEGY FOR THE SEVENTH PLAN

4.1 PERSPECTIVE FOR FUTURE DEVELOPMENT

The ultimate potential of the country through Major and Medium Irrigation schemes has been assessed as 58.5 M.ha. However, recent studies undertaken have revealed that the ultimate potential could be around 62.6 M.ha. The data for this is still not complete. Moreover some of the projects are likely to reduce the projected ultimate potential. Time is therefore not ripe to revise the figures of ultimate potential. The ultimate potential shall continue to stand at 58.5 M.ha.

As per indications available at the discussions for Annual Plan 1984-85, it is expected that 52.9% of the total ultimate potential would have been created by the end of VI Plan i.e. 31.00 M.ha. out of 58.5 M.ha. leaving a balance of 27.50 M.ha. for future plans. Whereas the percentage of creation of potential is as low as 13.9 in respect of Assam, it is as high as 83.5 in Tamil Nadu and 82.2 in Punjab. The all India average of creation of potential is 52.9%. As many as 10 States are below this average and 9 above. There is a lot of regional imbalance in the creation of potential. Statewise details are indicated in Annexure-VII.

In order to create the balance potential of 27.5 m.ha. in the future plans starting with the VII Plan, it has been estimated that a minimum amount of about 96,000 crores would be required taking an escalation rate of 5% compounded annually and basic cost of Rs. 20,000 for creating a potential of 1 hectare. The amount required during each of the future plans starting with the VII Plan (1985-90) and ending with the X Plan (2000-2005) have been worked out as under:

VII Plan Rs. 22,450 crores (as worked out by the Working Group)

	Outlay at 5% annual escalation	Outlay at 10% Annual escalation
VIII Plan	21200	29500
IX Plan	27000	27500
X Plan	26000	76000
Total	74200	153000

However, the basic rate of Rs. 20,000 per ha. assumed for working out the future outlay may not hold good since Irrigation development in future years will be dependent on exploitation of more difficult and less economical Schemes. As stated earlier the balance potential to be tapped at the end of VI Plan would be 27.50 M.ha. covering 22 States and Union Territories. During the V Plan (1974-78) a potential of about 4.06 m.ha. was created and it is expected that during VI Plan a potential of about 4.5 m.ha. would be created. At this rate it will be possible to create the entire assessed ultimate potential by 2005 A.D. only in respect of the following States: Andhra Pradesh, Gujarat, Jammu & Kashmir, Kerala, Manipur, Rajasthan and Tamil Nadu. The States which are backward in this respect and the year by which the full assessed ultimate potential would be created at the present rate are: Assam (2078), Bihar (2027), Himachal Pradesh (2022), Madhya Pradesh (2055). The other States are marginally backward. Exercises were undertaken with the various States in this connection when the objective of creating the entire ultimate potential by 2005 A.D. was impressed upon the States' representatives. It has how been possible to fix a target of 6.5 m.ha. for the Seventh Plan. Potential targets for future plans to achieve the objective have been worked out as under:

VII Plan (1985-90)	6.5 m.ha.	(as worked out by the working Group)
VIII Plan (1990-95)	8.0 m.ha.	
IX Plan (1995-2000)	7.7 m.ha.	
X Plan (2000-2005)	5.3 m.ha.	
Total	27.5 m.ha.	

It may be seen that targets for X Plan are kept low to accommodate for slippages in the earlier Plans. The potentials have been worked out keeping the current and previous performance in view. However, there is scope for improving the targets for VII Plan in respect of Bihar, Orissa & Uttar Pradesh. Annexure-VIII illustrates these points.

From the annexure it would be evident that in order to reduce the regional imbalance in the development of irrigation, it would be necessary to give special weightage to the irrigation sector plan of Bihar, Madhya Pradesh, Orissa and Uttar Pradesh. It would also be seen that the perspective attempted specially in the case of Madhya Pradesh and Bihar is on the higher side as compared to their achievement in the past. These States would, therefore, require not only building up of infrastructure but also special assistance.

4.2 APPROACH TO THE VII PLAN

During the last Six Five Year Plans it has been observed that stress was mostly on the achievement of the financial targets. While stress on the achievement of physical targets has also been laid down from time to time, no special stress was laid on the raising of productivity due to the input of irrigation waters brought to the land, with the result that the yield of foodgrains has not substan-

tially increased when compared to the achievement of other countries. It is, therefore, necessary that in this Plan, the target of achievement should not be creation of the potential or the targetted expenditure but the increase in the actual productivity level by better water management and CAD works together with channelising the resources in such a way that every rupee spent will bring the return as quickly as possible. In many of the projects, it has been seen that the works are taken up in all parts of the project without judging whether investment being made is going to remain idle for a long time or whether additional investment in other parts is likely to bring quicker return. Some of the projects have also been found to be lingering on for over 25 years on account of lack of proper initial planning. This short-coming in the previous planning is proposed to be corrected to a great extent by:

a) time slicing of the project

b) detailed planning and monitoring at all stages.

In some cases even after completion of a project, the canal and irrigation structures have not been found to be functioning satisfactorily commensurate with the need and aspirations of the farmers/beneficiaries. Supply at a right time and in a right quantity could not be ensured due to lack of expertise and coordination with other disciplines. There is a yawning gap of technical know-how between the users, beneficiaries and the management. This gap has got to be bridged. This can only be done by transfer of technology of water management and inter-action between the users and the management. For this an extensive training programme, action research, pilot studies, etc. will have to be provided together with CAD works.

Similarly, many of the newly completed works which have not been able to utilise the potential and raise productivity will need to be identified, the defects in them diagonised, remedial works implemented and the results achieved. This will need special assistance.

Another approach to achieve the above objective would be to reduce the time of completion of the projects. This may require taking up of fewer projects at a time ensuring their early completion instead of proliferation of projects resulting in thin spread of resources.

Above all, higher responsibility will have to be placed on the construction personnel and they will have to be responsible for a time bound programme. With a view to make a beginning in achieving the goal of creation of the entire irrigation potential of the country by the turn of the century special emphasis will have to be laid on enhancing outlays and targets in those States where untapped potential is available but financial resources are less. States like Bihar and Uttar Pradesh may have to earmark larger share of their plan resources to major and medium irrigation.

4.3 POLICIES FOR VII PLAN

Per-capita investment in Plan in different States had not been uniform in the past as would be observed from Annexure IX. In particular, some States like Bihar, Orissa and Uttar Pradesh have been consistently having low per capita investment in the Plan Sector. Some States have also low investment in Irrigation Sector. In the 6th Plan for instance, Assam, Himachal Pradesh, Jammu & Kashmir, Punjab and West Bengal have been incurring low expenditure in the Irrigation Sector. Measures have to be taken to build developmental infrastructure for irrigation in the low investing States, to enable provision of larger outlays for Irrigation development.

Some of the additional strategies to be proposed in the VII Plan are:

i) To avoid time over-run, funds should be earmarked for each project by the Planning Commission and before allocating the funds to the States, Planning Commission should ensure its implementation.

ii) There should be time slicing of projects/programmes during each Five Year Plan. Generally Major Projects should be allowed to be completed over a single plan period or even 2 Five Year Plans period, but not more. Time slicings of the programme will ensure that optimum progress is adhered to.

iii) Many projects are received in the CWC for technical examination and clearance, after they are taken up for execution by the States. The strategy should include clearance of only such projects which have chances of being financed in the Plan. The clearance of projects should be in stages viz. one for inclusion in the Plan and the other for actual implementation after verification of the availability of resources and materials.

iv) There are some projects which are incapable of being properly financed by the State Govts. due to constraint of the State's resources. However, such projects are necessary for the development of the State and will also have impact on the development of the nation as a whole. Such projects should be identified and additional central assistance be given to them.

v) A central authority for investigations of projects in N.E. Region comprising of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura should be constituted since the irrigation level in these areas is very low. These areas have unique problems and the existing governmental agencies are not fully equipped for investigation.

vi) Naegamwala Committee on rise in cost of projects and recently Public Accounts Committee of Parliament have recommended that the Central Water Commission should be associated with the investigation of large projects costing over Rs. 30 crores. This aspect should be implemented by creating a full-fledged organisation for investigation within CWC for co-ordination with the State Investigation Units. This organisation should also be vested with the authority to monitor progress of investigation and preparation of Master Plans of the States.

vii) A system of periodical evaluation of completed and ongoing major projects should be set up both at the Centre and at the State levels for diagnosing the short-comings of the project and to take remedial measures so that the projected benefits are realised.

viii) Escalation has not been taken into account in most of the projects. However, it is necessary to built an inbuilt mechanism for taking into account the rise in cost of projects due to price increase. This can be partially achieved through time slicing during the Five Year Plan periods.

ix) Irrigation projects which have not been approved by the Planning Commission should not be provided funds. Estimates should be updated periodically and got approved by the Planning Commission. Expenditure on unapproved projects should be treated by the Planning Commission as non-plan expenditure.

x) The beneficiaries and other field staff connected with water management have to be given intensive training in the modern methods of water management. The skill of the human resources has to be considerably improved for ensuring a dedicated and efficient service to the farmers. WALMIs should be set-up in each State and action research programmes initiated in each of the Command of the major projects.

xi) There are a number of projects where the gap between potential created and utilised in sizeable. These projects should be identified, the causes diagnoised and remedial measures undertaken. Extensive C.A.D. and water management programmes should also be taken up for these projects and special allotments either from Central resources or State Plan may be earmarked.

xii) As the principal aim of the VII Plan is to increase productivity and as this aspect is linked with various disciplines like agriculture, fertilisers, seeds, crop patterns, etc,, it will be necessary to set-up multi-disciplinary advisory groups including all disciplines, beneficiaries and management for all major projects whose recommendations should be binding on the management and beneficiaries. The aspect of maintenance of the irrigation system should also form part of their duties.

xiii) During the VII Plan, it should be the endeavour to accord priority for projects which can yield maximum returns with minimum investment. Such of those projects which are not showing proper progress due to some reason or other inspite of their being under execution for a long time should be given a low priority and if necessary no further work should be undertaken for a few years (atleast 2 years). Such projects should be first identified and thoroughly examined by a high powered body of technical experts covering all aspects of planning, design, construction etc. After the difficulties are sorted out the project should be given a new lease of life if necessary by pruning some of the original targets.

xiv) It has been seen that in case of some States the development of Irrigation is far below the national average. One of the reasons is constraint of financial resources. The States do not have sufficient finance to give over-riding priority to irrigation. It has been recognised that aid through external agencies can supplement the State's resources substantially. In fact about 10% of total outlay on irrigation projects is coming from external aid

at present. It will be necessary to increase this percentage and even in the available aid, it should be possible to give higher priority to States which have poor resources and are backward in Irrigation development.

xv) At present there is no dearth of technical experts in the field of irrigation in the country. But the available talent has not been used fully. There are many outstanding experts whose services are not used after retirement. It will be desirable to have a panel of such experts who could help in formulation, design, construction and operation of some of the major projects. This arrangement is available with the World Bank Agencies who conduct periodical reviews of projects. The panels at the Centre and States could be drawn and their assignments are patterned on the WB model so that the WB experts could be replaced by the Indian experts.

xvi) Above all, since the main objective of Planning is to provide more food and fibre through irrigation, it should be examined why the level of production i.e. yield is very low compared to the ones prevailing in other countries. An all out effort in a much bigger way than heretofore would be needed.

4.4 STRATEGIES FOR VII PLAN

Based on the terms of reference for the Working Group for VII Plan guidelines were issued to all the States for formulation of the VII Plan. They are:

1. Completion of ongoing projects started prior to 1.4.1974.
2. Provision of full outlays with probable escalation for medium projects undertaken upto the end of Sixth Plan.
3. Acceleration or completion of major projects of 5th Plan and Annual Plan 1978-80 during the Seventh Plan.
4. Adequate provision of outlays to fulfil World Bank commitments.
5. Provision of outlays based on actual requirements for construction of water courses and field channels upto 5/8 hectares blocks where these have not been constructed.
6. Provision of adequate funds for strengthening of any investigation and design agencies, as necessary during the 7th Plan.
7. Identification of areas of research and provision of sufficient outlays.
8. Provision for continuation of projects taken up during 6th Plan commensurate with the overall resource position.
9. Provision for unavoidable new projects.
10. Provision of necessary funds for modernisation of schemes after conducting diagnostic study.

CHAPTER 5

SIZE OF THE SEVENTH PLAN

5.0 The first task of the Working Group is to determine the target for creating irrigation potential during the Seventh Plan. While fixing the irrigation target and the size of the Plan, several considerations have to be made. They are:

i) the VII Plan target of foodgrain production,

ii) creating the ultimate potential of the country by the turn of the century,

iii) releasing the benefits/potential of projects that are ongoing for a long time,

iv) results of earlier studies such as the perspective plan, the National Commission on Agriculture etc., and

v) Financial considerations.

5.1 THE VII PLAN TARGET OF FOODGRAIN PRODUCTION

The objective of irrigation development is to increase food production. The target of irrigation has, therefore to be tied to the target of food production. In India, the production of foodgrain increased from 52.8 million tonnes in 1951 to 150 million tonnes (anticipated) in 1983-84. This increase has been, to a great extent, due to extending irrigation in the country during the corresponding period.

The additional foodgrain produced per hectare of irrigation is not precisely known. During the Sixth Plan, the yardstick was 500 kg. addition per hectare of irrigation. This criterion was discontinued during the Sixth Plan since different inputs act as a system and the synergic effect have not been sufficiently quantified.

Irrigation forms the hardware base for the soft-ware inputs like fertilisers, high yielding varieties of seeds etc. Since there is limited scope for increasing the physical area under cultivation, agricultural production can increase only through multiple cropping and achieving higher yields, for which irrigation is essentially required.

The target and achievement of foodgrain production and irrigation during the several Plans are as follows:

M. tons/M.ha.

	Foodgrain production		Irrigation Development	
	Target	Achievement	Target	Achievement
I Plan 1951-56	62.6	66.9	3.4	2.5
II Plan 1956-61	81.8	82.0	4.2	2.1
III Plan 1961-66	101.6	72.3	5.2	2.3
IV Plan 1969-74	129.0	104.7	4.8	2.6
V Plan 1974-78	125	125.6	5.3	4.1
VI Plan 1980-85	150	(awaited)	5.7	4.4

From the above, it is seen that there has been shortfall in foodgrain production as well as in the irrigation targets. However, the relationship between the two has not yet been established.

At present, the population growth is 2.2 to 3 percent per annum. At the rate of 5 per cent increase in food production per annum over a five year plan period, the required target of food production at the end of the VII Plan would be 25 per cent higher than at the end of the VI Plan.

The yield in rainfed and irrigated agriculture separately is also not available. However, it can be safely assumed that the irrigation target during the VII Plan should be more than during similar target in the VI Plan because of the higher population level. Considering that the target during VI Plan for major and medium irrigation was 5.74 m.ha., the target in the VII Plan could be kept at 6.5 m.ha.

5.2 CREATING THE ULTIMATE POTENTIAL OF THE COUNTRY BY THE TURN OF THE CENTURY

The ultimate Irrigation Potential from major and medium projects in the country is estimated to be 58.5 M.ha. The potential achieved till 1985 is likely to be about 31 M.ha. leaving a balance of about 27.5 M.ha. to be created by 2000 to 2005 A.D. i.e. in four more Plans. Judging from past performance, a sudden step up may not be possible. The target and achievement in the 6th Plan are only 5.74 M.ha. and about 4.4 M.ha. respectively. Viewed in this context, the targets for different plans could be as follows:

	M.ha.
VII Plan, 1985-90	6.5
VIII Plan, 1990-95	8.0
IX Plan, 1995-2000	7.7
X Plan, 2000-2005	5.3
Total:	27.5

The target for the 7th Plan has been tentatively fixed as 6.5 M.ha. from Major and Medium Schemes.

From the balance of ultimate potential and the current rate of achievement by the States, it is not likely that all States would fully create their ultimate potential at the same time. While distributing the 6.5 M.ha. among the different States, this aspect has been kept in view consistent with the position prevailing in the States.

5.3 RELEASING THE BENEFITS/POTENTIAL OF PROJECTS THAT ARE ONGOING FOR A LONG TIME

The Public Accounts Committee examined the planning process of irrigation in the country through the 141st report in 1983. The report draws attention to a large number of major and medium projects ongoing in the country which require early completion. About 88 major and 375 medium projects were started during the years 1974-80 without the States having sufficient resources for all the projects so taken up. These are swelling the ranks to make a total of about 200 odd major and 540 medium projects to spill into 7th Plan. It is uneconomical to continue them without completion, locking up resources without due benefits. The normal expected period of completion of a major project is from 8 to 10 years and, therefore, these projects started before 1980 require completion during the 7th Plan, i.e., by 1990.

The balance irrigation potential of projects already in hand are as follows:

	M.ha.
Major projects started before 1974	2.4
Major projects started from 1974 to 1980	7.3
Medium projects (mostly started from 1974 to 1980)	1.9
Total	11.6

This large potential may not be released by 1990 and most of the projects started during 1974 to 1980 will continue into 8th Plan.

In view of the recommendations of the Public Accounts Committee, and from economic considerations, it would be necessary to complete all major projects started before 1974 (potential 2.4 M.ha.) Medium Projects of Pre VII Plan Period (potential 1.9 M.ha) and to attempt creating a potential of 2.2 m.ha. from major projects started from 1974 to 1980, totalling to 6.5 m.ha. The potential of projects started prior to 1969 will, however, need review and the major part of it may not be available.

Experience has shown that this projected figure may not hold out on close scrutiny. It is observed that several of the earlier plan projects are not able to create their reported ultimate potential. Several others which have reported creation of their ultimate potential are not able to fully utilise them, and one of the reasons given is that the ultimate potential of these projects need downward revision. There is, therefore, likely to be shortfall in the ultimate potential of these earlier plan schemes.

5.4 RESULTS OF EARLIER STUDIES SUCH AS PERSPECTIVE PLAN, NATIONAL COMMISSION ON AGRICULTURE, ETC.

The Sixth Plan document suggested creation of 5.74 M.ha. from Major and Medium Irrigation and 8 M.ha. from minor irrigation for a total of 13.74 m.ha. The simultaneous perspective presented in the same document suggested a target of 17 m.ha. during the Seventh Plan and 19 m.ha. during VIII Plan. From this consideration, the target of major and medium irrigation should be of the order of 7.5 m.ha (if 9.5 m.ha. is targeted for minor irrigation).

The National Commission on Agriculture had also examined the prospects of creating irrigation potential. According to their assessment, the amount of irrigation during 7th Plan is of the order of 8 m.ha. total consisting of 5 m.ha. from major and medium and 3 m.ha. from minor irrigation. This perspective was for creating the then estimated irrigation potential of 110 m.ha. by 2025 A.D. Since the targets have subsequently been stepped up, it is necessary to keep a higher figure in the 7th Plan.

Taking an overall view of the prevalent conditions of projects and funding in the States, a target of 6.5 m.ha. is considered for the major and medium irrigation sector in the VII Plan.

5.5 FINANCIAL CONSIDERATION

The costs of projects have been increasing and the increase has been due to escalation in the cost as well as other reasons. The estimated cost of the ongoing projects have been increased by about 4100 crores in a three year period of the Sixth Plan. The spillover cost of the ongoing projects at the end of the Sixth Plan would be about Rs. 36,400 crores, out of which Rs. 4650 crores would be of the projects started prior to the V Plan. However, it is admitted that it will not be possible to complete all the projects in hand by 1990.

As per guidelines issued to States it is necessary to complete all pre-fifth Plan Schemes and all medium schemes, to accelerate all pre-Sixth Plan projects and to provide for projects committed to external aid programme. In order to realise the full ultimate potential by 2005-2010 A.D. it will also be necessary to provide for certain new projects in selected areas, and provide for modernisation, water development, construction of field channels etc. From this point of view the spillover costs and the outlays asked for by States would be as under:

	Spillover cost/ estimated cost	Outlay proposed
1. Major projects of pre-Fifth Plan period	4648	3264
2. Major projects of Fifth Plan period	8136	5884
3. Major projects of VI Plan period	10989	5122
4. Ongoing medium projects of VII Plan	2624	2273
5. New projects of VII Plan major and medium	-	2516
6. Modernisation, lining and drainage	4060	1358
7. Field channels, water courses	-	433
8. Water development, survey and investigation, research	-	687
Total		21537

It would be observed that Rs. 4648 crores is the spillover cost of the pre-V Plan projects, but only Rs. 3264 could be provided as, according to the States it would not be possible to complete all of them, during the VII Plan period.

From these considerations, it is seen that a minimum of 21,500 crores would be required for the Seventh Plan. During the Sixth Plan, about 17% of the total outlay in the State sector was provided for Major and Medium Irrigation. This was found to be inadequate. Since the Central Government has to give a lead to the State Governments in this matter, it is necessary that atleast 25% of the total outlays is provided for major and medium irrigation.

Thus, from all considerations it will be necessary to provide a minimum outlay of about 21-22,000 crores in the VII Plan.

CHAPTER 6

INTER-STATE PROJECTS

As is known, after protracted inter-State negotiations and consultations extending over several years or through the aegis of the Water Dispute Tribunals necessary inter-State accord is achieved on use and development of inter-State rivers in the country. A list of inter-State projects is given in Annexure-X. The inter-State Agreement so arrived at provide for the sharing of waters and sharing of cost and benefits of the individual inter-State projects. Execution of the project is carried out by one of the States on behalf of the others or jointly through an agreed arrangement by all the participant States, funds however being made available by all the party States. In some cases Control Boards are created by the States/Centre for ensuring efficient, economical and early execution of the projects concerned in the interest of all the participating States in the joint project. However, the allocated and agreed share of funds are to be made by the concerned States according to an accepted construction programme. Centre also assists in sponsoring the projects for World Bank or other external credit assistance. The Centre is involved in the Betwa River Board constituted through an Act of Parliament for the construction of Rajghat Dam benefiting Uttar Pradesh and Madhya Pradesh, in Bansagar Control Board set up through an agreement of the three States concerned for construction of Bansagar Dam on Sone River, the benefits being shared by Madhya Pradesh, Uttar Pradesh and Bihar. In respect of Sardar Sarovar Project on Narmada based on the decision of the Narmada Waters Disputes Tribunal, the Sardar Sarovar Construction Advisory Committee has been constituted under the Chairmanship of Secretary, Ministry of Irrigation and representatives of all the four beneficiary States of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan serving as Members. Inter-State projects such as Subarnarekha Project of Bihar, Orissa and West Bengal are taken up by the States. Some more projects such as Bawanthadi (Mah. - M.P.) Vamasadhara II (A.P. - Orissa) Lendi (A.P. - Mah.) Inchampalli (A.P. - M.P. - Mah.) may be considered by the States in due course.

However, from experience it has been seen that while states are enthusiastic about the taking up & execution of the Inter-State Projects later the participating States do not provide adequate outlays in their Five Year and Annual Plans to meet the expenditure according to the agreed and accepted construction schedule on the plea of financial constraints. It also happens that whether one or other State would be more interested or less interested in a particular Inter-State project would reflect in the response evinced in providing requisite funds. The Public Accounts Committee and the Estimates Committee etc. of the Parliament have been extremely critical of such funding arrangement for projects which having been started and are languishing for lack

of progress in a time-bound manner as originally planned, when the project was formulated and approved by the Planning Commission thereby resulting in exorbitant time and cost over-runs.. This has resulted in imbalance in development, besides avoidable delay in accrual of benefits expected from these projects not being derived to the common good of the Society. When such projects are included for external credit assistance, they are required to be completed in a time bound manner in terms of the agreement. This automatically follows that the participating States in a joint project provide and make available the requisite funds every year. But in practice, difficulties are met with.

To overcome such an unhappy situation, it is considered incumbant in the Planning process that for the committed inter-State projects the irrigation sector should be funded on a priority basis by the concerned States as a first charge on their financial outlays after meeting the non plan provisions. Further, while making the allocations during and after the Annual Plan discussions the Planning Commission also should earmark the requisite outlays under each State Plan and ensure that such allocations are carried out in the resources position assessments. The Executive Authorities or the Control Boards of such projects should work out realistic and time bound construction programme and arrive at the annual requirement of funds to attain the targeted completion dates of the projects. The State Governments in turn should accordingly make provisions in their overall plans as also in the respective Annual Plans. When once such Annual shares are determined and allocated by the Planning Commission as earmarked outlays, the States should make available to the Executive Agencies concerned, in advance, either every quarter or on half yearly basis their share of contributions to such joint projects. Planning Commission may also consider whether allocation from identified projects should be made available to the executing agencies by the GOI by debit to the block grants that are made available to the states by the Centre. The concerned Agencies can then plan their works-programmes in great detail, and build up the necessary infrastructure so that the works proceed smoothly accordingly to schedule utilising the funds made available in the utmost judicious manner for attaining a more harmonious stage of construction of the project so that benefits start accruing concurrently with the project implementation and achieve simultaneous full utilisation of the potential of the project on its completion.

This suggestion may involve issues of Centre-State relationship and the priorities the State may be having in planning and development of other sectors. The States might not readily agree to such a course but may have to be persuaded to do so in the overall interest of irrigation development in the country, which is sine qua non with improved agricultural production.

CHAPTER 7

NATIONAL WATER DEVELOPMENT

With a view to optimally utilise the available water resources of the country by storage and interbasin transfer from surplus to deficit and drought areas of the country, Ministry of Irrigation and Central Water Commission have formulated a National Perspective for water resources development. The Plan is in two components namely; (1) Himalayan River Development and (2) Peninsular Rivers Development. National Water Plan would give additional benefits of 25 million ha. of irrigation from surface waters, 10 million ha. by increased use of ground waters raising the ultimate irrigation potential from 113 million ha. to 148 million ha. and generation of 40 million KW of power.

The Peninsular Rivers Development consists of four major parts:

i) Inter-linking of Mahanadi-Godavari-Krishna-Cauvery rivers and building storages at potential sites in these basins.

ii) Inter-lining of west flowing rivers north of Bombay and south of Tapi:

This scheme envisages construction of as many optimal storages as possible on these streams and inter-linking them to make available appreciable quantum of water for transfer to areas where additional water is needed. The scheme provides for taking water supply canal to the metropolitan area of Bombay as also providing irrigation to the coastal areas in Maharashtra.

iii) Inter-linking of Ken-Chambal:

The scheme provides for a water grid for Madhya Pradesh and Uttar Pradesh and inter-linki canal, backed by as many storages as possible.

iv) Diversion of other west flowing rivers:

The narrow coastal plains of India along the west coast stretching from Kanyakumari in the south to the Tapi in the north have special and distinguished feature both in topography and water resources. The high rainfall on the western side of the "Western Ghats" runs down numerous streams which empty into the Arabian Sea. The construction of an inter-linking canal system backed up by adequate storages could be planned to meet all requirements of Kerala as also for transfer of some waters towards east to meet the needs of drought affected areas.

To carry out survey and investigations and other related studies for optimum utilisation of the water resources of the Peninsular Rivers systems and for preparation of feasibility report, the Central Government has set-up "National Water Development Agency" as an autonomous Society registered under the Societies Registration Act, 1860. The Union Minister of Irrigation is the President of the Society. Its members are drawn from the concerned States and Central Government Organisations. The Management of the Affairs of the Society is entrusted in accordance with the Rules and Regulations of the Society to the Governing Body which consists of 17 Members drawn from State and Central Government Organisations. The Chairman of the Governing Body is the Secretary, Ministry of Irrigation. Director General who is the principal Executive Officer of the Agency is the Member-Secretary of the Governing Body. The Director General is assisted by Chief Engineers and other Experts.

The objectives of the NWDA are as under:

a) To promote scientific development for optimum utilisation of water resources in the country.

b) To carry out detailed surveys and investigations of the possible storage reservoir sites and inter-connecting links in order to establish feasibility of the proposal of Peninsular Rivers Development forming part of National Perspective for Water Resources Development prepared by Ministry of Irrigation and Central Water Commission.

c) To carry out detailed studies about the quantum of water in various Peninsular River Systems and which can be transferred to other basins/ States after meeting reasonable needs of basin States in the foreseeable future.

d) To prepare feasibility reports of various components of the scheme relating to Peninsular Rivers Development.

The scheme of survey and investigations under the Peninsular Rivers Development is estimated to cost Rs. 107.42 crores and is expected to be completed in a period of 7-10 years. Although a provision of Rs. 30 crores had been made in the Sixth Five Year Plan (1980-85) under Irrigation Programme the Agency came into being only in July, 1982. An expenditure of Rs. 24.30 lakhs was incurred during year 1982-83 mainly for establishing Headquarters Office in New Delhi and some field offices and to procure office equipments and stores etc. A provision of Rs. 3.35 crores had been made in the budget grant of NWDA for the year 1983-84 which has now been revised to Rs. 2.40 crores. A budget estimate of Rs. 3.40 crores had been prepared for the year 1984-85. From this it would be seen that the likely spill over to 7th Plan from the 6th Five Year Plan proposals would amount to Rs. 24 crores. It is proposed to spend about Rs. 40 crores during the 7th Five Year Plan including the spill over amount of 6th Five Year Plan outlay.

The Agency has by now established five circles and a dozen Division Offices. It has collected several hydrological and hydrometerological data besides details of a number of projects formulated/contemplated by the State Governments in the Peninsular India. The works programme of 1983-84 envisages technical studies for computation of yields at 3 sites of Mahanadi river and 6 sites in Godavari river besides land use studies for Sheonath basin and the

area below Hirakud to the Delta Head by interpretation of satellite imageries and aerial photographs. Topo-sheet studies for locating sites of large reservoirs and also inter-links for transfer of water from one basin/sub-basin to another for optimal utilisation of available water resources on the basis of proposals given in the National Perspective Plan in respect of various river basins had also been included in the programme of 1983-84. Apart from the technical and topo-sheet studies the actual surveys in respect of possible sites of reservoirs and interlinks with regard to Damanganga-northern link upto Tapi and southern link upto Bombay and Parbati-Parwan-Kalisindh upto Chambal have also been envisaged to be taken up in 1983-84. During the year 1984-85 it has been programmed to complete balance portion of the works taken up in 1983-84 and also take up the technical studies regarding computation of water availability studies in respect of Ken, Betwa, Kalisindh, Parwan and west-flowing rivers north of Bombay and south of Tapi and west flowing Kerala rivers. Land use studies in selected project areas in the region of southern tributaries of Yamuna and also Wainganga and Indravati would be taken up in 1984-85. There is also a programme to undertake ground water assessment of Sheonath and Tel Sub-basins.

The NWDA as indicated above is entrusted with the task of carrying out surveys, investigations and preparing feasibility reports of inter-basin water transfers. The question of accruing the real benefit would arise after these schemes are implemented.

The expenditure for the NWDA has to be met with us a grant from Govt. of India. This has been provided for in the Plan provision. The newly created organisation has many problems of organising and carrying out the surveys as no State would want to admit that they have surplusses. This would need to be pursued at appropriate level. It seems there are some administrative problems for smooth functioning of the NWDA. They may have to be looked into by the Ministry of Irrigation in consultations with relevant departments.

CHAPTER 8

SEVENTH PLAN PROPOSALS

Consistent with the approach to the VII Plan the Central Water Commission in 1983 issued detailed general guidelines to the States for preparation of the Seventh Five Year Plan programme in the major and medium irrigation sector. This was followed by individual guidelines making reference to specific projects and issues as they are related to each State concerned (Para 4.4). The States were asked to forward their Five Year Plan proposals for incorporation in the Working Group Report.

The main thrust in the guidelines was to consolidate the gains already made in the irrigation sector, by completing the projects that have been in hand for a number of years, as also major projects started upto 5th Plan period, to comply with international commitments to external aid giving agencies like the World Bank, etc., to provide for strengthening investigation and design agencies, identification of areas of research, continuation of projects taken up recently commensurate with the overall resources position to provide for modernisation and to take up unavoidable new projects in drought prone and backward areas.

Since none of the States were ready with their Plan, discussions were held with most of the States by Member (P&P) and ex-officio Addl. Secretary to the Government of India, who is also convenor of the Working Group. It was impressed upon the States representatives that the first charge in the VII Plan will have to be completion of on-going projects and especially those taken up during the first three plans. The problems of each State were discussed and tentative proposals framed.

The major investment issues before the Working Group in framing the proposals for the Seventh Plan are as follows:

i) increasing the area under irrigation;

ii) early completion of project;

iii) controlling the time and cost overrun;

iv) reducing regional imbalance;

v) measures to increase efficiency of irrigation through modernisation, etc.; and

vi) investigation, preparation of Master Plans, research, etc.

While Public Accounts Committee was examining the planning process/ irrigation in the country, the constraints felt in translating the Plan into reality was mentioned by the Planning Commission as below:

i) major constraint is the limitation of the overall availability of resources;

ii) inadequate preparation of projects and incorrect estimation of the cost and time schedules;

iii) general lack of effective machinery for appraisal of investment proposals;

iv) inadequate decentralisation of the Planning process;

v) absence of timely and adequate feed back to the Planning Commission;

vi) inadequacy of the fiscal system to generate additional resources in the wake of inflation. There is a shortfall in resources experienced in real terms; and

vii) managerial deficiences and lack of adequate implementation capabilities.

The investment issues pertaining to time overrun, cost overrun, escalation etc. are inter-related. Projects are initiated within the political and planning process on a need based basis. However, due to constraints of resources and the inadequacy of the fiscal system to generate additional resources, the projects linger and languish.

In addition, it is necessary to improve the efficiency and quality of irrigation projects which are already complete through modernisation, construction of field channels etc. The Sixth Plan could not make much headway on modernisation due to overall constraints in resources, and due to the competing demands from the numerous ongoing projects.

Summing up the main ideas in these proposals are as follows:

1. As given in the guidelines to the States during the 7th Plan, it is intended to complete most of the major projects started prior to 1.4.74. These projects have a total spillover cost of Rs. 4648 crores and spill over potential of 24.2 th.ha. The cost estimates are based on the latest residual cost reported by the States, after including the various contingencies. The projects have been provided an outlay of Rs. 3264 crores for creating a potential of 1478 th.ha. Several of these projects are ongoing from the I Plan onwards. Recent reviews by the respective State Governments have indicated sizeable shortfall in their ultimate potential. It is expected that 33 of these projects will be completed during the VII Plan.

2. As stated in the guidelines issued to the States, some of the major projects taken up during the Fifth Plan i.e. subsequent to 1.4.74 are in an advanced stage and have started yielding partial benefits. A list of 47 such

projects may be seen in Annexure XIV. The Seventh Plan exercise have made provision for substantial completion of these major projects of the Fifth Plan. These projects have a total spill over potential of 7·3 M.ha. It is estimated that about 2.8 M.ha. potential may accrue from these projects during the Seventh Plan. It is intended to complete 21 of them in the Seventh Plan. The rest of them can be completed in the Eight Plan.

3. All medium projects started prior to 1.4.85 i.e. during and earlier to the Sixth Plan are intended to be completed during the Seventh Plan itself. It is estimated that these will have a residual cost of Rs. 2624 crores and spill-over potential of about 1.9 M.ha. Like the major projects, it is also likely that the ultimate potential of several of these medium schemes may have certain variations from those contained in their project reports. The States will duly revise the figures of potential; meanwhile it is estimated that about 1.4 M.ha. will accrue from these projects for an outlay of Rs. 2273 crores.

One of the investment issues and also guidelines is the consolidation of the irrigation potential already created and remaining to be utilised. When the Sixth Plan started, gap between potential and utilisation under major and medium projects was of the order of 4.2 M.ha. At the end of Sixth Plan, it is considered that the gap may further increase to 5 M.ha. One of the remedial measures considered for reducing this gap is the construction of field channels to 5-8 ha. blocks. This programme has been taken up in a large scale in 102 major projects by the several command area development agencies in the States. However, a few of the major projects are not covered by the C.A.D. programme. The major and medium irrigation programme will therefore, make provision for field channels to such projects. The provision on this account for the VII Plan will be around Rs. 433 crores excluding the provisions made in the reports of recent projects which will be sufficient to cover an area of about 2.16 M.ha.@ Rs. 2000 per hectare.

During the Sixth Plan, it was proposed to take up modernisation of pre-plan and earlier plan projects. However, due to constraint of resources, not enough headway could be made on this account. The Sixth Plan had provided Rs. 720 crores for modernisation. However, due to overall constraints of resources and on account of pressing needs of ongoing projects, the actual expenditure on modernisation in Sixth Plan was less than 60 per cent. During the Seventh Plan also, constraints of resources may continue in relation to the need for modernisation. However, a provision of Rs. 1358 crores is provided for modernisation and conjunctive use schemes.

It is now recognised that the States have already taken up a large number of projects. This has inhibited additions during the Sixth Plan. The Working Group in the Planning Commission which reviewed the State's Sixth Plan proposals had taken into account 115 major and 266 medium projects newly proposed by the different States for the Sixth Plan. The VI Plan made a provision of Rs. 1070 crores for new projects; however, paucity of funds affected these new projects. Therefore it was not possible to spend more than 60 per cent of this amount during the Sixth Plan. The situation will continue during the Seventh Plan also since the number of ongoing schemes in the Seventh Plan is larger than these during the Sixth Plan in terms of number, size of their ultimate potential, spillover of their latest cost etc. etc. Therefore, it may not be be possible to include many new schemes of the Seventh Plan except perhaps a few medium projects in drought prone backward tribal areas, etc. A modest

provision of Rs. 2516 crores is provided for this purpose in the Seventh Plan.

The other major thrust in the Seventh Plan programme will be to strengthen the investigation and design agencies so that Master Plans are duly prepared by the States. Similarly, research in the field are also considered necessary. Provision of Rs. 687 crores have been made for survey, investigation and research agencies. The State-wise position of the projects, their outlays during Seventh Plan as proposed by the States are given in Annexure XV.

MODERNISATION OF PROJECTS

It has been realised that for the projects to yield promised results and also to improve the performance of the existing works, it is necessary to undertake modernisation in a big way. A beginning was made during the 6th Plan. However, due to financial constraints, much of progress could not be achieved. It is expected that about Rs. 460 crores forming about 64% of the outlays provided would have been spent during the Sixth Plan. The main reason for this state of affairs is perhaps the non-availability of closing period and a proper programme of work. With a view to overcoming the lacuna it is necessary that a diagnostic study be undertaken for all existing systems and to improve their efficiency.

The States have to undertake review of the performance of each system and furnish regular performance reports to the concerned authorities. It has been observed that in some projects, some of the earlier planned works were not provided. The study should include proper assessment of requirement of left over works and rectifications of defective works. An outlay of 5 to 10% of the project cost will have to be provided for this purpose. It is also to be ensured that all canals will be provided with measuring devices with proper rating curves so that it will be possible to find out the availability or not of planned discharges in the canals. Recourse to automatic measuring devices will have to be amply made. The diagnostic study should also include cropping study, water periods, etc. For this purpose, a multi-disciplinary team for inculcating the modern methods of agriculture has to be assigned the job. It is expected that CWC/Ministry of Irrigation will evolve suitable proforma for including all the items mentioned above in the modernisation projects. As it is, only 8 modernisation schemes have been approved and 31 projects have been received in the Central Water Commission for examination. Unless the modernisation concept is taken up in a big way, it will not be possible to consolidate the gains already achieved.

From the discussions held with the States, it is apparent that out of 65 projects (as indicated in Annexure-XI) stipulated for completion in VI Plan, 20 would be completed and 45 will be continued in VII Plan. Similarly out of 15 schemes which were also started earlier to 1.4.76 (as in Annexure XII) only three would spillover to VII Plan. All the other 17 schemes started before 1.4.76 but were expected to go into VII Plan (as in Annexure XIII) will also be ongoing schemes of VII Plan. Thus out of 97 projects started before 1.4.76, 65 projects will figure as ongoing projects of VII Plan.

In response to the guidelines issued to States the State Governments have indicated the following position of plan-wise distribution of on-going projects during VII Plan:

Plan	Total No. in VI Plan	No. deemed to be completed	No-Ongoing
I Plan	11	8	3
II Plan	13	8	5
III Plan	24	6	18
Annual Plan 1966-69	10	4	6
IV Plan	30	7	23
Total Pre-V Plan	88	33	55
V Plan (1974-78)	73	8	65
Annual Plan 1978-80	15	1	14
Total	176	42	134

It has been the intention to complete most of the projects started prior to V Plan and also all medium projects taken up prior to the VII Plan. Efforts have been made to provide maximum outlays in the VII Plan as a first charge.

The various state Governments have indicated their requirement of funds and the additional potential they would be able to create. Total outlay and potential targets indicated by the State Governments comes to Rs. 21537 crores and 8 M.ha. respectively. However, it has been found possible to create a maximum potential of 1 M.ha. per year under major and medium irrigation programme during the recent past. In this background the Working Group is of the opinion that the maximum annual rate of creation of irrigation potential could be only 1.3 M.ha. for the coming year. Thus, the target of potential for the VII Plan period is fixed at 6.5 M.ha. The outlay should however be Rs.21537 crores.

Details of Major Projects and Statewise details of medium Projects, Modernisation, Field Channels, Water Development etc. are shown in Annexure-XV.

An abstract showing the likely spillover cost, outlay proposed, spillover potential and possible target for VII Plan as indicated by the various State Governments is as below:
Potential target recommended by the Working Group is shown in Column 9.

Sl. No.		FINANCIAL			PHYSICAL			
		Latest esti. cost	Residual cost for comple-tion	Outlay in VII Plan	Ulti. pot.	Spill over pot.	Pot. targeted for VII Plan by States	W.G.
1	2	3	4	5	6	7	8	9
MAJOR SCHEMES								
I.	Pre-Fifth Plan Schemes (52 Nos.)	9539	4648	3264	10054	2412	1487	1478

1	2	3	4	5	6	7	8	9
II.	V Plan & Annual Plan 1978-80 Schemes (76 Nos)	11327	8136	5884	8148	7323	3256	2796
III.	VI Plan Schemes (72 Nos.)	11620	10989	5122	5793	4106*	1011	425
IV.	New Major of VII Plan (48 Nos.)	6977	-	1685	2194	-	347	181
MEDIUM SCHEMES								
V.	Ongoing Medium Schemes of VII Plan (540 Nos.)	4294	2624	2273	2648	1894	1436	1430
VI.	New Medium Schemes of VII Plan	831	-	831	-		151	5
VII.	Modernisation Schemes	-	3177	1358	1911	1854	357	150
VIII.	Field Channels Water Courses etc.	-	-	433	-	-	-	-
IX.	Water Development	-	-	687	-	-	-	-
	TOTAL	-	-	21537	-	-	8045	6465

* Excluding spillover potential of Sardar Sarovar Project

CHAPTER 9

PROPOSALS FOR CENTRAL SECTOR IN SEVENTH PLAN

During the successive five year plans there has been significant increase in irrigation potential created in the country. The irrigation potential existing in the country before planning started was 22.6 million ha. At the end of the 6th Plan it is likely to be above 68.8 M.ha. During the first two and a half decades of planning, irrigation potential was being created at the rate of about 1 M.ha.. per year. During recent years, this rate has been stepped up on an average over 2 M.ha.. per annum. There have been significant increase in the number of major and medium projects under execution all over the country. When the Fifth plan was initiated in 1974, the number of major and medium projects spilling from earlier plans were about 75 major and 155 medium projects. However, at the beginning of the VIth Plan the number of such schemes were 176 major and 447 medium spilling from previous plans. In addition the VIth Plan took up several more projects so that the number of country schemes in the 7th Plan are likely to be about 240 major and over 540 medium irrigation projects.

Irrigation is a state subject and irrigation projects are executed by the State Governments within their own development plans. Central plan assistance is in the form of block loans and block grants and are generally not tied to any project or sector of development. However, in certain areas of irrigation development the centre has the overall responsibility of planning co-ordination and direction. The centre has also to create the necessary data base to be used for planning and implementation of irrigation projects. Accordingly a number of schemes have to be taken up in the Central Sector. Several agencies at the centre like the Central Water and Power Commission, the Central Water and Power Research Station, the Central Soil and Material Research Station, the National Institute of Hydrology, the Central Board of Irrigation and Power etc. are concerned with these aspects. In addition there are other agencies like the Narmada Project Preparation Cell and the Sone River Commission. The National Water Development Agency which has recently been started is also funded by the Central Sector.

During the 6th Plan several projects and schemes have been taken up in the Central Sector by these Central Organisations for the fulfilment of the Centre's objectives in the major and medium irrigation sector of the plan. Such schemes will be continued, further strengthened and new schemes added to keep up with the greater pace of development in the 7th Plan. Some of Central Sector schemes are very briefly enumerated below. The Central Water Commission has taken up a number of schemes under the central sector like the Dam Safety Service, Monitoring of irrigation and multi-purpose projects, the man-power cell, the

Foreign Assistance Units; hydrological observations, agro-economic & socio-economic surveys of irrigation projects, Water and power information systems, application of space technology for water resources; training of engineers, technical documentation, special analysis system, project preparation cells, systems engineering, environmental studies, reservoir sedimentation studies etc.

Within the Central Water Commission, there will also be provision for maintaining a central panel of experts and consultants on Water source problems. Their service could be made available to the State Governments. The Chief Engineers of State Governments are so engrossed in the problems of an administrative nature that they are not able to devote their full attention to solving such water resource problems. At present these problems are referred to private consultancy agencies. A panel of experts at the centre would enable the Central Government to exercise better co-ordination with greater cost effectiveness.

The Central Water & Power Research Station is the premier institution of hydraulic engineering and allied research in India. It has been recognised as a regional laboratory and training centre for ESCAP and also as an institution for Post Graduate Research and award of Post Graduate degrees. To enable the CWPRS to fulfil its functions and contribution to irrigation development in the 7th Plan, the ongoing Central Sector Schemes will be continued with further strengthening and addition as needed. Some of the important schemes are the water and power information systems, hydraulic structures research centre, mathematical modelling centre, training cell, investigations pertaining to Estuarine systems, sediment exclusion and disposal research, extension of water shed study etc.

The Central Soils & Material Research Station has been carrying out field and laboratory studies in the discipline of soil mechanics, rock mechanics, concrete technology, sediment surveys, chemical analysis of construction materials and river/waters. Their activities include foundation investigations for irrigation and power projects, construction materials survey, concrete mix design for irrigation and power projects, study of rock masses in connection with construction of dams and tunnels etc. sedimentation studies, basic and applied research and training of in service engineers. CSMRS has contributed substantially in the promotion of projects in India and abroad. The plan schemes funded in the 6th Plan Central Sector will be continued and further strengthened.

The National Institute of Hydrology is a premier institution under the Ministry of Irrigation carrying out systematic research in basic theoretical and applied hydrology which has a great relevance to National Planning in the area of Water resources. The Governing body is drawn from several central organisations like the Central Water Commission, the Central Ground Water Board, the University of Roorkee, etc. The Institute has completed the first phase of five years 1979-84 and the one year transition period 1984-85 and is gradually developing into a Central Institute of Hydrology and Water Resources. The research activities of the institute have gained momentum and expertise and experience. It is also actively involved in the field problems through sponsored research projects. The National Institute of Hydrology is assisted by contribution from the UNDP.

The Sone River Commission was established in 1980 through a resolution which envisaged that the work will be completed in a period of seven years. It

has also been proposed that the Sone River Commission will prepare a master plan for the Bundelkhand region. At present the important works with the Commission is preparation of a comprehensive plan for optimum utilisation of land and water utilisation of the Sone river basin. There is also a scheme for residential and office accommodation for officers and staff, since the work of the Commission is to continue. The revised scheme for the comprehensive plan of the basin has been prepared for continuing the work.

The Central Board of Irrigation and Power had its inception in 1977 and it has been co-ordinating all research activities in the field of irrigation and power. Being composed of Chief Engineers in charge of all irrigation and power authorities, it is able to initiate remedial research and the adoption of the results thereof. Many of the States have research stations but the first charge on these stations is the solution of local problems, testing construction material and quality control of work. The research stations main handicap in taking up research work of a fundamental and basic kind is lack of sufficient finance. The CBIP therefore has mooted a research programme as applied to river valley projects financed by Ministry of Irrigation in Central Sector. The scheme has been in operation in most of the research stations of the country and have made very useful contribution to understand common problems and to improve upon investigation and research. The research programme has established linkages among various state research stations, educational institutions and national organisations like the National Remote Sensing agency, Calcutta Port Trust, Central Mining Research Station etc. The consequent discussion in the CBIP sessions, symposia, seminars and workshops have made valuable exchange of experiences in the country and abroad.

The research scheme applied to river valley schemes is continuing scheme and in all 163 research projects were sanctioned. It is expected that a total of 200 projects will be sponsored in the Seventh Plan. The total outlay proposed in the Central Sector is Rs.10 crores. Further details of the work by CBIP and research stations are embodied in Chapter 13, Science and Technology.

A Project Planning Cell headed by a Chief Engineer has been established in the Ministry of Irrigation for the preparation of project reports in Narmada Valley. The function of this Cell is to prepare reports of the projects in a farm that would be required by International Financial Agencies in order to obtain necessary assistance. The World Bank have indicated their readiness to finance the expenditure of the Cell.

With full staff strength, the expenditure during the Seventh Plan is expected to be of the order of Rs.2.27 crores including the non-recurring expenditure.

In order to carry out survey and investigations and other regulated studies for optimum utilisation of the water resources of the peninsular river systems and for preparation of feasibility reports, the Central Government has set up an autonomous body named National Water Development Agency. Details of the objectives and activities of the NWDA are described in Chapter 7, National Water Development. It is proposed to spend Rs.40 crores during the Seventh Plan by the NWDA.

Since Seventh Plan proposals do not encourage taking up of new projects of considerable capacity and as it will be necessary to ensure realisation of full assessed ultimate potential by 2010 A.D. It is essential to have a shelf of well investigated projects during Seventh Plan. These projects should confirm to the standard stipulations to ensure their early clearance by the Planning Commission. In order to persuade the States to continue this activity of investigation of major and medium projects It is suggested that this activity of investigation of major and medium projects be financed by the Centre as a centrally sponsored activity. The investigation activity will be done in close association with Central Water Commission. Towards this end the Central sector programme provides Rs. 100 crores during the Seventh Plan.

Many of the interstate projects especially the joint projects are languishing due to non-provision of adequate outlays by the participating States. In the overall national interest it is necessary that such joint projects are not allowed to linger on. However to assist and also to persuade the States to provide adequate allocation to such projects. It is suggested that this Central Govt. may finance 50% of the cost of such joint components of the projects with the stipulation that these projects would be implemented as per direction of the Joint Boards under the Ministry of Irrigation and State Ministers. This 50% of the expenses for implementation would be financed by the Centre as special or advance Plan assistance and the rest 50% will have to be provided for by the States as per thier share. This will be a first charge on their Plan resources and if they did not provide these from their budgets the shortages would be directly allocated to the Projects from the Central block grants to the States. Under such stipulation an allocation of Rs. 500 crores has been provided for Rajghat, Bansagar and Subarnarekah projects.

Thus the Central sector outlays on all the items mentioned above totals to Rs. 912 crores. The proposed outlays against different activities/ organisations are summed up as under:-

		Proposed outlay (Rs. in Crores)
1.	Central Water Commission	202.35
2.	Central Water and Power Research Station	31.71
3.	Central Soil & Material Research Station	12.21
4.	National Institute of Hydrology	8.27
5.	Sone River Commission	4.78
6.	Central Board of Irrigation and Power	10.00
7.	P.P. Cell (Narmada)	2.77
8.	National Water Development Agency	40.00
9.	Investigation of projects	100.00
10.	Special Central assistance to joint inter-state projects.	500.00
	Total	912.09
	Say	Rs.912 Crores

CHAPTER 10

PLANNING FOR SCARCE CONSTRUCTION MATERIALS

10.0 Non-availability of construction materials like Cement, Steel, fuel oil, explosives etc. in adequate quantities is one of the reasons for delay in implementation of irrigation projects. The delay in execution, in turn escalates the cost of the project. In spite of several measures taken to improve the timely supply of them, the problem persists.

10.1 REQUIREMENT OF SCARCE MATERIALS FOR THE SEVENTH PLAN

The Seventh Plan proposals formulated by the Working Group envisage creation of additional irrigation potential to the extent of 6.5 m.ha. under major and medium irrigation with an outlay of about Rs.21,500 crores. The likely year-wise outlay would be as under:

	Rs. Crores
1985-86	2800
1986-87	3500
1987-88	4000
1988-89	5000
1989-90	6200
Total	21500

The year-wise requirement of cement, steel and explosives for the Plan period is estimated to be as under:

Period	Cement (Quantity in lakh ton)	Steel (Quantity in lakh ton)	Explosives (Quantity in M.T.)
1985-86	45	4.5	8065
1986-87	56	5.6	9260
1987-88	64	6.4	9897
1988-89	80	8.0	11700
1989-90	99	9.9	12820
Total	344	34.4	51742

10.2 CEMENT

Allocation of cement for the Irrigation and Power project used to be made by the Ministry of Industry through CWPC till June, 1973, CWPC used to re-allocate it to the different States/Projects. Subsequently, State Governments were empowered to allocate cement for the Irrigation and Power Projects from their quota. However, for the Central Projects re-allocation continued to be made by CWPC. This procedure was revised from 1st January, 1979 when the quota for Irrigation and Power Projects were earmarked out of the total State quota. With the introduction of the levy system in 1982 onwards quota for the irrigation and Power sectors is now being separately allocated from the levy category apart from the State Quota. This allocation is made on quarterly basis and it is re-allocated by CWC, CEA and Ministry of Irrigation.

Ministry of Irrigation has set up a coordination Committee which reviews quarterly supply position of cement to the various allottees and decided further allocation for the subsequent quarters. Central Water Commission has prescribed a proforma which the project authorities are required to furnish to consider their requirements for allocation of cement for the Major & Medium Irrigation Projects. Similarly in order to monitor the supplies, the Central Water Commission has prescribed a proforma to indicate the monthly supply/consumption/stock position. To render assistance Central Water Commission holds quarterly meetings with State/Project authorities in which representatives of the Cement Controller and cement manufacturers are present. The supply of cement for the various States/Projects are reviewed to identify and take steps to remove the bottlenecks.

On the recommendation of the Ministry of Irrigation, the Cement Controller has posted two inspectors for each region to monitor the Cement supplies to the various projects. However, the fact remains that the States/Projects are not being supplied alloted cement. Some of the reasons mentioned by the Cement Controller's Organisation during the quarterly review meetings are, Power cuts/Mechanical failures in the plants, delay in placement of supply order etc.

Central Water Commission continues to co-ordinate supplies and take up the matter with Cement Controller's Organisation to ensure smooth flow of cement for various projects immediately on receipt of complaints, and also after examining details given in the monthly statements.

10.3 STEEL

The policy of the distribution of Iron & Steel materials has undergone many changes depending on the production and availability. It was in October, 1979 that the Irrigation Sector got a bulk allocation of Steel materials and the Central Water Commission started allocation to the different States/Projects depending on their requirement and approved outlays. However, since July, 1983, the J.P.C. now allocates steel only for certain structural and plates for priority sectors including irrigation sectors which is re-allocated by the Central Water Commission. Allocation, is being done quarterly. The position of availability of Steel, at present, is satisfactory. The States/Projects are now getting their requirement for other categories of steel materials directly from the producers/stockyards. However, whenever there is difficulty, the project authorities get in touch

with the Central Water Commission and necessary assistance is rendered.

10.4 EXPLOSIVES

During the past few years, the availability of explosives from indigenous source had been erratic as a result of which the project authorities were facing acute shortage of explosives (Gelatine 80W) and the CWC had to arrange for import of about 6016.745 MTs. of explosives in order to meet the requirement of projects during the year 1978-79, 1979-80 and 1980-81.

As far as explosive is concerned, there is no quota allocated for the Irrigation sector. The States/Project authorities place their orders directly with the producers. Only in cases where the supplies are not made according to their requirement, intimations are sent by States/project authorities to the Central Water Commission. On receipt of such intimation, necessary assistance is rendered to expedite the supplies.

10.5 COAL

For coal, States/Project authorities place orders directly with the suppliers. Complaints have been received from the States of Haryana, Gujarat, Punjab, Rajasthan and U.P. that they are not getting adequate supply of coal due to non-availability of wagons. The Ministry of Irrigation took up the matter in the meeting of the Cabinet on Industrial Infrastructure in Feb.1981, where a decision was taken to allot 1500 wagons per month for movement of coal to these States for the next months. However, as the number of wagons was not available, the position was brought to the notice during discussions in the meeting held by Secretary (Co-ord.), Cabinet Secretariat in July, 1981. The representative of the Railway Board intimated that from Aug. 1981 onwards, 15 rakes of wagons will be allotted per month.

The Railway Board have intimated that the coal to the Irrigation projects will now be supplied from Singrauli Coal Fields by M/s. Central Coalfields Ltd. instead of Dhanbad Collieries by M/s. Bharat Coal Ltd. The Rajasthan Canal Project Authorities and the Irrigation Department, Haryana represented that the Central Coal Fields Ltd. will be supplying non-cooking coal grade 'F' from this colliery which is of much inferior quality and as such Railway may continue to supply coal from Dhanbad Coal Fields. The Ministry of Irrigation took up the matter with the Railway Board who, in the first instance, did not agree to change their decision but in subsequent meeting, it was agreed to arrange part supplies from Dhanbad/Jharia Coal Fields to R.C.P. Presently, the supply position of rakes for movement of coal is satisfactory.

10.6 Judging from the present situation, no great difficulty is anticipated in making steel, explosives and coal available for the Seventh Plan Period in adequate quantities. The supply of cement may however continue to pose some difficulty in the coming years to alleviate for which concerted efforts should be made by the different Departments concerned.

CHAPTER 11

EMPLOYMENT GENERATION DURING THE SEVENTH PLAN

Generation of employment on a project depends upon many factors like methods of construction, period of construction, availability of finance, etc. However, the most important aspect is the application of technology. In many projects, the deployment of mechanised system becomes inescapable while in many cases large manual labour can be deployed in tune with the construction programme and in areas where the same is available in abundance.

For the calculation of additional employment generated by the major and medium irrigation project schemes, a norm was worked out by the CWC on the basis of half-yearly employment returns received from the project authorities. By this employment to 850 persons would be generated for every crore of outlay as per the 1980-81 standards. Assuming a 10% price rise per year this comes down to 560 persons per crore of rupees of investment, for the year 1984-85 which is the base year for the 7th Plan. Assuming the same rate of price rise and total outlay of Rs. 21,500 crores, employment potential for different years of VII Plan has been worked out as shown below:

Year	Outlay/ Expend. (Rs. in crores)	Employment generated (per crores of invest-ment (No. of persons)	Total employ-ment potential	Additional Potential
1984-85 (Base Year)	1822	560	10,20,320	-
1985-86	2800	505	14,94,000	473,680
1986-87	3500	455	15,92,500	98,500
1987-88	4000	410	16,40,000	48,500
1988-89	5000	370	18,50,000	210,000
1989-90	6200	335	20,77,000	227,000
				1057,680

As would be observed that total additional employment generated in all categories during the 5 years of the 7th Plan is likely to be 10,57,680. Analysis of the half yearly returns had further indicated the following compositional break-up of the employment generated:

1.	Technical Personnel	- 4%
2.	Ministerial	- 4%
3.	Skilled Workers	- 10%
4.	Unskilled	- 82%

As per the above, the compositional structure of the additional employment works out as under:

1.	Technical Personnel	- 42,307
2.	Ministerial	- 42,307
3.	Skilled Workers	- 11,05,768
4.	Unskilled	8,67,298

In order to collect detailed information on various aspects of manpower and information on shortage and surplus in various categories, proforma has been prescribed by the Central Water Commission in consultation with the Planning Commission.

CHAPTER-12

WATER RESOURCES UTILISATION

Water is the most precious gift of nature to India. Its most beneficial use is a sine qua non not only for the economic development but also for meeting the growing food requirements of the country. The population of India is about 685 million and is expected to increase to about 1000 million by 2000 A.D. It is necessary to keep in view, the domestic and Industrial requirements of water and increase the tempo of irrigation development. Water is a scarce commodity so much so that by the turn of the century it may be a critical resources to mankind and therefore to be husbanded in a most scientific and efficient manner. In India, the availability of water is highly uneven, both in space and time even during the monsoon season. As a result the country is afflicted by drought-flood-drought syndrome. Thus the conservation and most efficient utilisation of the water resources for beneficial use such as irrigation, hydro-power, flood control, water supply, navigation and other purposes through storage reservoir at appropriate locations and water transfer system is a must.

12.1 PREPARATION OF MASTER PLAN

The Working Group for Sixth Plan suggested preparation of Master Plans for irrigation development by end of 1980 so that the shelf of new project would be available for future implementation. The time schedule was expected to be strictly adhered to in order to help achieve the ultimate objective of creating the entire irrigation potential of the country by the turn of the century. During Sixth Plan not much head way could be achieved with the result that this has to be taken up more vigorously during the Seventh Plan. It would be necessary to have a monitoring wing for preparation of master plans. It is necessary that a high level committee in the Central Water Commission has to be formed which would hold two meetings every month with some of the States and provide necessary expertise and advise so that the master plan of all the States are available by the end of Seventh Plan. It will also be necessary to set-up a permament Directorate in the Central Water Commission to co-ordinate the work of the Committee for the various States. The Committee has to liaise with the various organisation of the Govt. of India and the States and the various bodies consisting of engineers, agronomists, scientists, economists, sociologists etc. It would also be necessary to obtain active participation of to Ground Water Board, the Department of environment, the River Commission etc. Sufficient funds will have to be provided at the end of the Central Sector for this explicit purpose.

12.2 IDENTIFICATION OF RESERVOIR SITES

The total surface water available in the country is nearly 1780 thousand million Cubic metres (1440 MAF) and out of this 666 thousand MCM (540 MAF) have been estimated to be utilisable in view of the topographical and hydrological limitations. Out of a geographical area of about 328 million hectares, the cultivable area, the net sown area and the gross cropped area is 186 M.Ha., 142 M.Ha. and 172 M.ha. respectively. The ultimate irrigation potential of the country by major and medium and minor schemes (both surface and ground waters) is about 113 million hectares. Out of this, the potential created upto 1980-81 is about 61 m.ha. and target upto the end of 6th Plan is about 70 m hectares. So far about 700 dams have been built to serve major and medium irrigation project commands. The total storage capacity, including those of small tanks, is assessed to be about 160 thousand MCM (130 MAF). Further projects with an effective capacity of over 74 thousand MCM (MAF) are under construction. Although this itself is a commendable progress, it falls far short of the requirements to enable bulk of the water resources being utilised. The storages so far built hardly enable a seventh of water available in our country to be utilised beneficially for consumptive purposes.

Irrigation has been given high priority in the revised 20-Point Programme and the 6th Plan as well. The Ministry of Irrigation and the Central Water Commission have also formulated an outline of a National Perspective Plan for optimum development and efficient utilisation of Water resources. It provides for creation of additional storages in various river basins as feasible and for connecting links to enable additional utilisation of flood flows. The National Perspective Plan envisages utilisation of about 220 thousand MCM (180 MAF) of water to bring under irrigation an additional area of 25 million hectares by surface flows apart from 10 million hectares by increased use of ground waters. This would increase the utilisation to about 50%. The Government of India have created National Water Development Agency for taking up surveys and investigations of Peninsular River Component of the National Perspective Plan and Prepared feasibility reports of the storage reservoirs and links canals.

It is essential that an overall national view is taken for identifying the optimum storage sites left over. Since in India, the water is a state subject the States have to identify all the possible optimum storages sites while formulating the respective water basin master plans and take up the implementation. However, while identifying the storage sites some basic approach has to be follwed:

i) Providing storage at appropriate locations with feasibility of interlinking various river systems.

ii) The storage sites being limited, optimum development of available storages to be explored before development of new storages.

iii) Most efficient use of land water may have to be kept as principal objectives.

iv) The storages should have multi-purpose and multi-objective development of water resources namely irrigation, flood control hydro-power generation etc.

v) Capability to serve large irrigation commands as far as possible by gravity.

vi) The site identified may have to be within the legal and constitutional framework amongst the States as well as existing treaties with the neighbouring countries.

vii) Conjunctive use of surface and ground water may also be explored.

viii) The ideal storage sites have generally been exploited over the years. Efforts to create new storages at sites with even lesser benefit-cost ratio may have to be made.

12.3 PROJECTS BENEFITING: TRIBAL AREAS

During the Sixth Five Year Plan, 178 major and medium irrigation projects were identified under Tribal Sub Plan to derive benefits to the extent of about 1625.88 th. ha. in the tribal areas.

During the Sixth Plan only 17 projects have been completed and irrigation potential of 41.83 th. ha. has been created. It is expected that 4 major and 52 medium irrigation projects are also likely to be completed by the end of the Sixth Plan to create irrigation potential of 228.85 th. ha. in Tribal areas. Prior to Sixth Plan, 51 minor and medium irrigation projects were completed and irrigation potential of 177.58 th. ha. was created in the tribal areas. Besides this the tribal area is also to be benefited from 19 projects under main plan of State Governments to the extent of 215 th.ha. in the areas of their concentration.

It is now evident that many of projects under the Sub-Plan could not be accelerated for timely completion owing to various constraints. Mainly these are inadequate financial resources, confrontation with tribals for acquisition of land, the inter-State disputes in Cauvery Basin, etc.

To speed up augmentation of irrigation facilities in the concerned sub-plan areas,it is necessary to draw a time-bound perspective plan and accord intense priority based on economic need, for implementation of schemes in a phased manner. Adequate financial resources are also to be ensured for such projects so that under no circumstances these are either held up or slowed down. Similarly flow of scarce construction materials has also to be assured to avoid any impediment in the progress of the work.

Besides the above, it is also required to prepare Master Plan of Irrigation for their respective Sub-Plan areas to direct the details of available resources and irrigation potential for its full utilisation and to derive thereof the optimum benefits. The State Governments have been urged to prepare the time bound perspective Plan and also the Master Plan. They may furnish the same now.

It is also essential that monitoring the projects to achieve the target within the time-schedule and also to evaluate the extent of benefits that will be reaching the beneficiaries as contemplated is taken up.

12.4 LAG IN UTILISATION

It has been observed that while the projects have reported creation of certain amounts of potential the utilisation figures are far less. It has been observed that by June 1983 a potential of 5.1 million hectare remained un-utilised due to various reasons. The lag in utilisation is likely to remain the same or be marginally reduced by the end of Sixth Plan. Annexure XVI shows the potential created and utilised in various States as intimated by the States during December 1983. A list of projects the lag in utilisation is pronounced, i.e., those projects where more than 25% of the potential created still remains to be utilised shown in Annexure XVII.

It can be seen that in case of Ukai, Rajpur Canal, Jawahar Lal Nehru Lift Canal, Sewani, Chambal, Tawa, Jayakwadi, Sarda Sahayak, Parallel Lower Ganga Canal, the utilisation is very low. This aspect is engaging the attention of the Government of India for quite some time. It has been thought in order to utilise the entire potential created. It would be necessary to take up water management measures. While the Working Group for Seventh Plan has laid stress for constructing field channels, water courses, a step-up is also required in other water resources development activities. Some of the ideas mooted at several time to bridge the gap between creation of potential and utilisation realised were:

i) To get water courses constructed at Government cost right upto 4-5 hectare blocks if necessary by diverting funds from the huge outlays slated for construction of major and medium projects.

ii) To give technical clearance to new major and medium projects only if provisions had been made for construction of field channels up to 4-5 hectare blocks at Government cost.

ii) To sanction new projects only if provisions of funds is ensured in State Plans for utilisation of irrigation potential already created.

In order to attain full productivity by increasing the utilisation from the created potential, it would be necessary to ensure that in the projects like Sarda Sahayak, Rajasthan Canal St-I, Jayakwadi, Tawa, Chambal, Gandak, Nagarjunasagar, Kosi, Canal System special efforts will have to be made. It would be necessary to undertake a diagnostic study of the causes and take up effective remedial measures. These projects should be treated in a separate category and extensive water management and C.A.D. programme in a time bound manner be implemented. Special allotments of funds either from the Central resources or from the State Plans may have to be earmarked for these projects.

The Water Management aspects and the need for training for the same are spelt out separately.

CHAPTER-13

SCIENCE AND TECHNOLOGY COMPONENT IN THE IRRIGATION PROGRAMME

13.1 INTRODUCTION

The development of water resources, to increase the irrigation potential, to meet the demand of industry and to satisfy basic human needs, has been stressed in all our plans and given priority. This leads to plan many more irrigation projects and having exhausted ideal sites on more difficult terrain which pose complicated problems relating to geology, hydrology and construction materials. Economical use of conventional materials, search of new materials, utilisation of new technique in data collection and data analysis and development in design and construction practices for dams and other hydraulic structures much larger in size then hiterto constructed is an essential requirement. These aspects require improved investigation methods, more realistic and scientific study of materials and monitoring of structures during construction and post construction stages, for further improvement in economical designs.

13.2 EXISTING RESEARCH ORGANISATIONS

Most of the State Governments have established the research laboratories which are meeting the local demands, whereas Central establishments like Central Water and Power Research Station, Pune and Central Soil and Materials Research Station, New Delhi are working in the field with more experienced Staff and sophisticated equipment received under the aid from various International agencies. Besides these specific centres of research and development, a number of autonomous bodies and universities and other teaching institutions, such as DVC; IISc, Bangalore;University of Roorkee; Anna University of Madras; Indian Institutes of Technology and major engineering colleges are also engaged in research pertaining to water resources development. The CBIP has recently taken up with the State Governments of Haryana, Himachal Pradesh and newly formed States Meghalaya, Nagaland, Tripura and Manipur the question of setting up research stations so as to study the regional problems in better way. As an outcome of research carried out necessity of Water and Land Management Institute for better utilisation of land and water under water resources projects was felt. The states like Maharashtra, Andhra Pradesh, etc., have already established such institutes.

13.3 CENTRAL BOARD OF IRRIGATION AND POWER, NEW DELHI

13.3.1 Coordination of Research Activities

The Central Board of Irrigation and Power since its inception in 1927 has undertaken the task of coordinating all the research activities in the field of Irrigation and Power development and disseminating the results thereof. Being composed of Chief Engineers in-charge of all Irrigation and Power authorities, it is in the most advantageous position of knowing the areas requiring further research and initiating steps to remedy the situation and also encourage the adoption of the results of the research in the actual projects.

Many of the State Research Stations are well equiped both in respect of facilities and personnel and they have been handling satisfactorily various research problems referred to them for solution. However, as is natural, the first charge on the equipment, facilities and personnel of the State Research Stations is the solution of urgent local problems that are faced by their respective Irrigation Departments. The major part of the time and resources of the State Research Stations are, therefore, devoted to the solution of specific problems relating to state projects as well as for testing construction materials and quality control of works. They could devote very little attention and personnel to the solution of problems of a more basic nature having wider application. Experience in major research stations all over the world indicates that if any particular institution is continuously engaged only in testing or the solution of specific problems, it soon loses touch with the broad advancing front of knowledge and in course of time the solution proposed by them become stereotyped and sometimes obsolete. Further such research stations which are out of contact with the latest advances in knowledge in the field of applied research all over the world, may find it difficult to deal with problems faced by non-conventional sites or where non-conventional only materials have to be employed as they would be conversant only with the relatively standardized methods of solution. It is therefore, essential that all major research stations take part at least to some extent in the solution of problems having wider and general applications and understandings of the various basic phenomena and make offective contributions to interact with other research stations within the country and abroad. Based on a survey of the current situation, the Central Board of Irrigation and Power found that many of the State Research Stations were handicapped mainly in the matter of finance in taking up problems beyond the scope of immediate and pressing requirements of the irrigation and power projecfs in hand or under operation, although basic infrastructure is available.

13.3.2 Research Scheme Applied to River Valley Projects

The Central Board of Irrigation and Power, Therefore, mooted a research programme namely Research Scheme applied to River Valley Projects (RSRVP) financed by the Ministry of Irrigation, Government of India for studying basic problems not related to any specific scheme or project but the results of which would have a significant impact on the future development of irrigation activities in the country. This scheme has been in operation at most of the research stations of the country and very useful contribution has been made to the understanding of certain common problems and filling up gap in the knowledge, thus contributing to improvement in

investigation, design and construction practices.

The CBIP under RSRVP has established linkages among various State Research Stations, Educational Institutions and National Organisations for development and dissemination of technical knowhow, and also to avoid duplication of research. CBIP since its inception is playing important role of co-ordinating the irrigation researches undertaken in the country.

The research projects, within the scope of River Valley Projects are under study at various State Irrigation Research Stations, IITs, Agricultural Universities, Regional Engineering Colleges and at National Institutes like National Remote Sensing Agency, Calcutta Port Trust, Central Mining Research Station etc. The results of studies carried out by the above Institutes are brought out as Technical Reports and circulated to various Institutes, Planning, Design and Construction Engineers of State and Central Irrigation departments where these are used further for better understanding of behaviour of civil engineering structures or for achieving economy in construction.

The Board organises Annual Research and Development Sessions, Symposia, Seminars and Workshops relating to Irrigation. The R&D Session provides a forum for discussion of technical papers based on the research conducted at various state research stations and organisations in the country, as well as those dealing with problems of design, construction, maintenance and operation of irrigation projects. The proceedings brought out as document of these papers and deliberations provide a source of reference to the irrigation engineers. These discussions are highly useful as they enable the various experts/advisers of the various organisations to have an exchange of views and experiences and to aquaint themselves with the latest advances made in the country and abroad in the irrigation sectors for an overall improvement in the technical standards of research and practices.

It is the earnest and constant endeavour of the Central Board of Irrigation and Power to obtain more and more effective monitoring of the work being done under Research Scheme applied to River Valley Projects. With this in view, the Board periodically reviews the existing methodology and procedure for the formulation, processing and monitoring of research projects under the scheme. Based on the experience gained from the existing methodology as well as keeping in view the suggestions made and opinions expressed by senior officers of the Ministry of Irrigation, Central Water Commission, Planning Commission, etc., such an exercise has been made. Sixteen (16) subject areas have been identified in consultation with Member (D&R) , CWC, and for each one of these subject areas, an Advisory Committee for Research and Development (ACRD) has been constituted. The details are furnished below:

I Management of Floods

II Hydraulic Structures

III River Hydraulics and Sediment Transport

IV Hydraulic Machinery and Equipment

V Ground Water

VI Coastal Erosion and Tidal Hydraulics

VII Hydrology

VIII Irrigation Methods and Water Management

IX Environmental Effects of Water Resources Projects

X Socio-economic Aspects of Water Management

XI Soil Mechanics

XII Rock Mechanics

XIII Masonry and Concrete Structures

XIV New Materials and Processes

XV Application of Space Technology

XVI Instrumentation and Measurement Technique

The important feature of the constitution of the ACRDs is that six to eight members constituting the committee are experts in respective fields and are senior officers of CWC and Ministry of Irrigation, CWPRS, Pune; CSMRS, New Delhi, NIH, Roorkee; NRSA, Hyderabad; CMRS, Dhanbad; NEERI, Nagpur; Central Ground Water and Pollution Boards; National Institute of Oceanography, Goa; Calcutta Port Trust, Calcutta; Indian Photo-Interpretation Institute, Dehradun; National Instrumentation Ltd., Kota; NHPC; Deptt. of Science and Technology; National Chemical Laboratory, Pune; Universities; IITs; various Engineering Colleges; Cement Research Institute; State Departments; Indian Institute of Public Administration; CWRDM, Kerala; Bharat Earth Movers; Tunga Bhadra Steel Products; etc. and CBIP Specialist Co-ordinators. The Member-Secretary, Central Board of Irrigation and Power is the convenor of all these Committees.

The ACRDs will meet 3-4 times in a year and identify the problems requiring study, plan research programmes and also give necessary guidance and orientation to the research projects under operation. The Chief Investigators/ proposer of new projects are invited to these meetings of ACRDs for free and in-depth discussion about the technical programme, methodology and net results expected. Such an interaction between the investigator and specialists guarantees fruitful results of studies undertaken.

The Standing Advisory Committee (SAC) the highest body with Chairman, CWC as its Chairman, CWC as its Chairman, finally recommends to the Government of India research projects taking an overall view of the progress of the research programme.

The Research Scheme applied to River Valley Projects is a continuing scheme and in all 163 research projects were sanctioned to conduct the studies during VI Plan under this scheme. Out of 163 research projects about 36 projects will spillover in the VII Plan. The likely expenditure to be incurred during the VII Plan on these projects would be about Rs.56.00 lakhs. Some of the ACRDs at their first or second meeting have identified areas of study enclosed as Annexure A. These subject areas have been circulated to all the research stations, teaching institutions and other autonomous bodies for formulation of Projects. It is expected that a total of 200 research projects in above areas will be sponsored for completion by 1989-90 at an estimated cost of about Rs.950.00 lakhs. The total outlay proposed for the spillover projects as well as additional projects is Rs. 1000 lakhs during VII Plan. In addition to Rs. 1000 lakhs for plan an amount of Rs. 100 lakhs is also proposed for the non-plan expenditure to be incurred during the VII Plan.

13.4 CENTRAL WATER AND POWER RESEARCH STATION, PUNE

The Central Water and Power Research Station (CWPRS), Pune, which was founded in 1916 is the premier organisation in the country devoted to research in the area of water and energy resources and water borne transport. The activities of the institution encompass a number of sectors such as Irrigation, Energy, Shipping and Transport etc., which account for as much as 35% of the total Plan outlay. Thus the institution is required to advise on research aspects of river training and flood control projects, development of river basins and setting up of multipurpose projects, design of ports and harbours, ship model testing, geophysical and seismological investigations, foundation and structural engineering and a number of other disciplines associated with the development of water and energy resources.

The question of co-ordination between the CWPRS and other Scientific and Engineering Institutions was referred to the High Level Committee set up by the Govt. of India under the Chairmanship of Dr.M.S. Swaminathan which reviewed the functioning of the CWPRS in 1976. The High Level Committee has examined the objective of the Research Station vis-a-vis coordination with academic and scientific/engineering institutions in the country. It has been pointed out that there is very strong coordination through various forums such as the research meetings of the CBIP, the Research Advisory Body set up by the Ministry of Shipping and Transport, and under the aegis of the Department of Science and Technology.

With a view to furthering this coordination it was recommended that the Governing Council and Technical Advisory Committee of CWPRS include representatives of CBIP, Department of Power, Central Electricity Authority, Department of Science and Technology, Ministry of Engery, representatives of various States and nominations made by the Ministry of Irrigation from amongst eminent scientists and engineers in the country.

In order to foster the coordination further it is considered not only to increase interaction with various other institutions through attendance at seminars, symposia etc., but also to introduce a mechanism whereby eminent scientists and engineers could be invited for limited periods of time to pursue some research work in the CWPRS and at the same time encourage experienced research workers from CWPRS to proceed on sabbatical leave or deputation to academic and other research institutions. This suggestion emanated from the Honourable Union Minister for Irrigation during an inspection of CWPRS and the matter is being followed up.

An independent assessment carried out by UNDP expert, Prof. M.L. Albertson, has estimated that the research efforts of CWPRS have resulted in savings of the order of Rs.100 crores on River Valley Projects and the same order in the development of Ports and Harbours. The facilities set up under the Ship Hydro-dynamics, and Cavitation Research Centre have resulted in massive savings of foreign exchange. The Ship Testing Tank alone results in an import substitution efforts of over half million dollars per annum, whereas the Cavitation Research Centre which undertakes performance tests of turbines results in an annual savings of almost twice that value. It has been estimated that during the IIIrd, IVth and Vth Plans the studies carried out by CWPRS have resulted in an effective savings of Rs.200 Rs.350 and Rs.500 Crores respectively.

During the Seventh Plan Expansion Schemes, emphasis has been laid on an early completion of six (6) spillover schemes from the Sixth Plan including the Hydromechanics and Calibration laboratories, Hydraulic Structures Research Centre and the Water and Power Information System. These projects are being undertaken with UNDP assistance and are expected to be completed by March 1987, i.e. within the first two years of the Seventh Plan. Further seventeen (17) new schemes under "New Items" will be taken up during VII PLan. These schemes suggested have been taken primarily from the 'New Schemes' list indicated in the Sixth Plan document. It may be pointed out in this connection that on the recommendations of the High Level Review Committee set up by the Government in 1976, a Governing Council and a Technical Advisory Committee had been set-up. The project documents of eight schemes have been recommended by the Technical Advisory Committee and had been approved by the Governing Council in principle for processing within the available funds. Some of these schemes are in an advanced stage of consideration and it is expected that these would be sanctioned before the end of the Sixth Plan.

The remaining schemes would be put up for consideration of the Technical Advisory Committee, which is presently in the process of being reconstituted. The total outlay proposed for the Seventh Plan is Rs. 31.71 Crores as per details given below:

	Rs. in lakhs
Expansion Scheme of CWPRS, Pune	
Continuing Items (sub Schemes)	401.61
New Items(sub schemes)	2769.47
Total : Rs.	3171.08 lakhs
Say Rs. 31.71 crores	

The details of Sub Schemes under Continuing and New Items are indicated in Annexure B.

The Non-Plan expenditure proposed to be incurred during VII Plan by CWPRS is Rs. 18.00 Crores. In addition to the above UNDP/Bi-lateral input is US $ 2,60,02,(

13.5 CENTRAL SOIL AND MATERIALS RESEARCH STATION, NEW DELHI

The Central Soil and Materials Research Station is a Central Organisation set up in the year 1954, dealing exclusively in the field of geomechanics and construction materials. It renders consultancy services to various departments of Govt. of India, State Governments, State Electricity Boards, Public Sector Undertakings and other agencies of the country. The Research Station has also been carrying out field and laboratory studies in the discipline of Soil Mechanics, Rock Mechanics, Concrete Technology, Chemical Analysis of construction materials and river waters.

The activities of the Research Station are categorised in broad fields as mentioned below:

1. Foundation Investigations for irrigation and Power projects and other Civil Engineering Structures.

2. Construction materials surveys and recommendation regarding suitability of materials and methods of construction.

3. Mortar/concrete and shortcrete/gunite mix design for irrigation and power projects for economical utilisation of locally available materials.

4. Study of the behaviour of rock masses in connection with construction of dams, tunnels, underground power houses etc.

5. Chemical analysis of water and other construction materials, sedimentation studies of rivers/reservoirs.

6. Basic and applied research on problems sponsored by CBIP and self sponsored research

7. Training of in-service engineers of irrigation and power Departments of various States in the disciplines being dealt with at the Research Station.

Four schemes namely (i) Facilities for Research and Testing in Rock Mechanics (ii) Establishment of Research and Testing facilities for Rockfill (iii) Behaviour of concrete under high triaxial stresses and (iv) Establishment of Soil Dynamics Laboratory are under implementation with the assistance of UNDP. In addition to the above four projects, the project "Development of Equipment and testing facilities for soft and sensitive/swelling Soils" has been approved by the Government and included in the second (extended) UNDP country programme.

The following two new UNDP Schemes are to be taken up in hand during the 7th Plan:

i) Research on creep of concrete

ii) Investigations for case studies for the performance and safety of existing hydraulic structures.

A total outlay of Rs 12.21 Crores is proposed for the continuing and new schemes of Central Soil and Materials Research Station during the Seventh Five Year Plan 1985-90 as per details given below:

Continuing Schemes	Rs. 761.39 lakhs
New Schemes	Rs. 459.48 lakhs
	Rs. 1220.87 lakhs

Say Rs. 12.21 Crores

The details of continuing and New Schemes are indicated in Annexure C. The Non-Plan expenditure proposed to be incurred by CSMRS, during VII Plan is Rs. 3.42 Crores. In addition to the above UNDP input is US $ 64,97,720.

13.6 NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE

The National Institute of Hydrology was set up with effect from 16th December, 1978 as an Autonomous Society registered under the Societies

Registration Act, 1860 under the Ministry of Irrigation, Government of India with its headquarters at Roorkee, Uttar Pradesh. The Institute is the premier National Research Organisation entrusted with the task of carrying out systematic scientific research activities in basic theoretical and applied hydrology, which has great relevance to national planning and development activities in the sphere of water resources.

The Institute was established to take care of short term and long term research and to link it with planning objectives at state, regional and national levels. NIH has membership drawn from educational, research and field organisations. The work program of the Institute is also directed towards these objectives of interaction between various research, educational and field organisations. The HYDCOM unit of the Institute is responsible for the co-ordination of training, dissemination of knowledge and research efforts of the various organisations in the country in a coordinated manner. The institute has been trying to develop a good linkages with the educational and research organisations in the country with that in objective that Institute was established in the University of Roorkee Campus which has a strong water resources base and the Irrigation Research Institute of UP Govt. is also located here. The Institute right from the stage of its inception has been involve involved in the consultancy project to help the State and Central Govt. organisations in the development of hydrological methodologies dealing with specific field problems.

The President of the Society is the Union Minister for Irrigation. The affairs and funds of the Society are being managed, administered, directed and controlled by the Governing Body with the Secretary, Ministry of Irrigation as its Chairman. United Nations is collaborating with Government of India in the establishment of the NIH under a UNDP Project and UNESCO is the executing agency. The UNDP Project is for 5 years duration and it started in March 1979. It envisages financial support from UNDP of the order of US $ 25,01,100 with a counter part expenditure of Rs. 128.85 lakhs by the Government of India.

A plan provision of Rs.38 lakhs has been made under plan and Rs.9.40 lakhs under non-plan in the demands for grants for 1983-84 of the Ministry of Irrigation for the purpose. For the year 1984-85 an EFC Memo has been prepared envisaging an outlay of Rs. 55.50 lakhs to provide for continuation of staff infrastructure facilities created during 1978-84 and to make provision for additional minimum requirement of staff and building to carry out research activities in the area identified under work-plan which are necessary for creating a nucleus of research in the Hydrology at national level. A separate proposal for Provision of HYDCOM Unit for the year 1984-85 has also been prepared. The provision of EFC Memo for the period 1985-90 will be taken up shortly.

So far three Annual General Meetings and one special General Meeting of the Society of NIH have been held. The Governing Body of the Institute has so far held 17 meetings.

Under the UNDP scheme a VAX-11/780 computer has been installed and is in operation from October 1982 onwards. Studies are being carried out in the following 7 areas of basic research:

1. Hydrologic Analysis of Stream flows in a Basin

2. Water Balance of river Basins

3. Water-shed Models including those for snowfed basins and basin with limited data.

4. Method of operation of a system of reservoir taking into consideration the effect of irrigation, flood control and power generation.

5. Evolution of methodologies for flood estimation, forecasting and control.

6. Methodologies for ground water estimation and development.

7. Study of extreme storms and floods and their implication in hydrologic synthesis.

Work on system studies on upper Canal Project and Estimates of MPF for Narmada at Navagaon site in Gujarat has been carried out.

The International Hydrological Programme Unit which was under the CSIR so far and transferred to this Ministry has been attached to National Institute of Hydrology. The requirement of funds for the Seventh Plan in NIH as estimated to be Rs. 6.88 Crores; the break up of which is given below:

Continuing Schemes	(Rs.in Crores)
i) Continuation of NIH Phase-I	2.30
New Schemes	
i) Strengthening of Diversification of NIH Phase-II	2.88
ii) Representative catchments Projects	0.70
iii) Staff Colony I Stage	1.00
Total:	Rs. 6.88 Crores

13.7 SUGGESTIONS FOR IMPROVING THE WORKING OF INSTITUTIONS

13.7.1 The difficulties faced by Research Stations in the matter of recruitment and posting of the required staff should be solved. Once a research programme is sanctioned, which includes the sanction for the required staff, the formalties to obtain administrative sanction to the staff should be dispensed with or suitably streamlined so that the staff would be in position almost immediately after sanction to the scheme is received.

13.7.2 Suitable incentives such as telescopic time scales, merit promotions or awards should be given to the personnel working in Research Laboratories to overcome the problem of frequent transfers and/or stagnation.

13.7.3 Research fellowships similar to UGC/ICMER/ICAR fellowships may be introduced and administered by the CBIP, the selected personnel being attached to various research stations for carrying out approved programmes applicable to River Valley Projects.

13.7.4 There is the need for proper interface between Educational Institutes and State Research Stations. State Research Stations may formulate research projects and conduct studies in collaboration with the educational institutes such as IITs; Regional Engineering Colleges etc. State Research Stations may also take assistance of Educational Institutes in analysing the data collected.

13.7.5 Provision for research to the extent of minimum 1% of total outlay for Major and Medium Irrigation Programme should be made in the Irrigation Budget by the State Governments during the Seventh Five Year Plan period 1985-90.

13.8 The financial outlays required on the Science and Technology component of the Major and Medium Irrigation Programme will be as follows:-

		Rs. in Crores
(a)	CBIP, New Delhi	10.00
(b)	CWPRS, Pune	31.71
(c)	CSMRS, New Delhi	12.21
(d)	NIH, Roorkee	6.88
	Total	Rs. 60.80 Crores

NON-PLAN

		Rs. in Crores
(a)	CBIP, New Delhi	1.00
(b)	CWPRS, Pune	18.00
(c)	CSMRS, New Delhi	3.42
(d)	HYDCOM Secretariat	1.22
	Total:	Rs. 23.64 Crores

Research Stations of State Governments — Plan 50.00 Crores

(Average estimated figures are based on the information received from Six States) — Non-Plan 10.00 Crores

EXTERNAL ASSISTANCE

(a)	CWPRS, Pune	US $ 2,60,02,000
(b)	CSMRS, New Delhi	US $ 64,97,720
(c)	NIH, Roorkee	US $ 25,01,100

PROBLEMS REQUIRING STUDY UNDER DIFFERENT SUBJECT ARE AS IDENTIFIED BY ADVISORY COMMITTEES FOR RESEARCH AND DEVELOPMENT (ACRDs)

I. MANAGEMENT OF FLOODS

A. River Behaviour and Control

1. Effects of Floods on river morphology
2. Studies of river scour behaviour (Rationalisation of river formulae)
3. Effect of embankments on river regime
4. Evolving economical river training measures and criteria for design (Design of spurs, groynes)
5. Fixation of rational criteria for spacing of flood control embankments
6. Evaluation of cheaper and effective anti-erosion works for river bank protection
7. Studies of morphology of braided streams
8. Comparative evaluation of various identified flood control measures in a particular basin with particular reference to its impact on soil development

B. Hydrology and Hydrometry

1. Rainfall runoff studies for drainage
2. Evolving norms for design of drainage systems in irrigation areas
3. Mathematical modelling for Flood forecasting
4. Glaciers and snow pack
5. Flood forecasting
6. Estimation of discharge of spilling rivers

C. Agronomy

1. Studies of crop out puts in areas prone to floods compared to areas protected from floods
2. Studies of fertilising effect of silt carried by flood

D. Other Topics

1. The effect of land use on runoff and sediment
2. System analysis and water resource management
3. Satellite and remote sensing technology

4. Instrumentation research

5. Methodology of flood damage assessment.

II. HYDRAULIC STRUCTURES

1. Diversion Tunnels

- Permissible Maximum velocity in concrete lined tunnels.
- Protective measures against abrasion due to bed load sediment consisting boulders, pebbles, shingle etc.

2. Outlet Tunnels

- Hydraulics of pressure flow tunnels including air-ontrainment and cavitation aspects.

3. Spillway and Outlet Works

- Necessity of guidewalls in a long chute spillway in relation with the length and slope of chute channel, head, discharge intensity, type of energy dissipator etc.

4. Flushing velocities in conduit depending upon the size, shape end slope (including reverse slope) of conduit, size, shape and concentration of sediment etc.

5. Different aspects including vibrations of high head gates.

III. RIVER HYDRAULICS AND SEDIMENT TRANSPORT

1. Transport of Non-Uniform, Non-Cohesive Sediment

(a) Critical tractive stress of the non-uniform, non-cohesive sediment.

(b) Rate of sediment transport of mixtures by actual measurement of the transport of the different fractions.

2. Wash Load Transport

(a) Sediment yield from catchments on seasonal basis rather than annual basis and comparision with measured wash load transport rates.

(b) Effect of wash load on bed materials transport.

(c) Detailed turbulance measurements in sediment laden flows and effect of sediment on turbulance fluctuations.

(d) Limiting capacity of the stream to transport wash loads and deposits on bed and sides at higher concentrations as well as data on limiting concentrations of fine sediment in channels for proper design of lined channels and conduits carrying water.

3. Effect of Non-Uniformity and Unsteadiness

(a) Laws governing sediment transport and channel resistance under unsteady non-uniform flows.

(b) Effects of varying discharge on channel resistance and the differences in sediment transport laws under uniform and non-uniform flows only.

4. Scour Ground Hydraulic Structures

Collection of field data through instrumentations to record variation of scour depth with time so that mechanism of scour is better understood.

5. Reservoir sedimentation

Mathematical models for prediction of deposition of sediment with in the reservoir.

6. River Formulae

Formulae or correlations for parameters like width, depth, slope, velocity, size of bed material etc. of stable rivers.

7. Relationship for river meanders

Relationships for shape, size and rate of movement or deformation of river meanders.

8. Bed form in rivers

(a) Estimation of bed form geometry.

(b) Relationship between bed form and rugosity co-efficient or friction factor in a flow formulas.

(c) Correlation between geometry of bed form and its rate of movement.

(d) Estimation of bed load transport on basis of bed form movement and comparison with estimate made using sediment transport functions.

(e) Problems associated with measurement of magnitude of the flows and loads due to un-steadiness encountered during floods.

(f) The effect on the downstream of large capacity reservoirs built on sediment laden streams in the light of recorded data on the water relases, channel dimensions, longitudinal slopes and sediment sizes in out flows.

9. Degradation downstream of structures

Degradation downstream of dams, barrages etc. Estimation of depth, length, rate of degradation and effect on tail water rating curve.

10. Afflux at Bridges

(a) Methodology for estimation of afflux in case of flashy river.

(b) Constricted versus unconstricted water-ways.

11. Miscellaneous

The effect of construction of embankments on aggradation or degradation of the river bed, the effect of silt load on the river bed, to study the relationship between discharge flood levels, and silt load and such other projects.

IV. HYDRAULIC MACHINERY AND EQUIPMENT

1. Scale effects between models and prototypes of turbines and pumps.

2. Cavitation performance and erosion of hydraulic machinery.

3. Analysis and computation of flow in hydraulic machines.

4. Vibration and noise in hydraulic machinery.

5. Investigation of inlet flow into centrifugal pumps and its prediction by theory.

6. Stability of characteristic in pumps.

7. Behaviour of pumps under dynamic operating conditions (frequency characteristics under the influence of water hammer and cavitation).

8. Rotor dynamic impeller force.

9. Pump bearings, seals and thrust devices.

10. Improvement of efficiency at partial loads in Francis turbines.

11. Investigation of flow conditions and hydraulic forces acting on the guide vanes of Francis turbines.

12. Development of pump-turbine units.

13. Small hydropower units

(a) Performance of pumps functioning as turbines.

(b) Development of low head machines such as Bulb/Tubular and straight-flow turbines for a range of 3m to 10m head.

(c) Development of small turbine units (for mini-micro hydel power stations) with capacities 0.5 MW to 3 MW.

V. GROUND WATER

1. Design of tubewells-both high yield tubewells and low yield tubewells study of strainers, particularly in regard to their field performanc :

2. Evaluation of ground water pollution-potential of dynamic and static ground water, and evaluation of ground water utilisation.

3. Quality of ground water, design of skimmer tubewells.

4. Ground water pollution.

VI. COASTAL EROSION AND TIDAL HYDRAULICS

1. Fundamental and experimental work on the assessment of littoral drift.

2. Theoretical work on change in harmonics of tides entering the estuary.

3. Study of erosion of cohesion sediments in flumes.

VII. HYDROLOGY

A. Precipitation including snow

1. Effect of orography on rainfall distribution.

2. Study of moving rain storms for design storm studies.

B. Evapotranspiration

1. Evaporation from irrigated and forested areas.

2. Estimation of resorvoir/lake evaporation,

3. Regional relationships using climatological data.

C. Base Flow

1. Statistical characteristics of low flows and drought studies.

D. Isotope Hydrology

1. Use of Isotope in hydrology flow and soil moisture measurements.

E. Hydrometry

1. Establishment of rating curves and their extension comparison of different procedures.

F. Urban Hydrological model on different types of nature and artificial surfaces for a particular city e.g. Delhi, Kanpur etc.

G. Soil Moisture

1. Drainage of agricultural soils and its effect on rainfall-runoff characteristics.

H. Flood Studies and Environmental Impact Studies

1. Changes in water regimes due to afforestation, deforestation, drainage improvement, river regulation, etc.

2. Dam break problems and flash flood studies.

3. Routing of floods in rivers using different techniques and to study their suitability/applicability.

I. Water Quality Studies and Sedimentation Studies

1. Erosion studies sedimentation sources and sensitivity or erosion to hydrological variables and models for sediment production, transport and deposition.

2. Water quality modelling effluent problems.

J. Representative and Experimental Basin Studies.

1. Water Balance Studies.

K. Data Systems and Computers

1. Development of data base management system for hydrologic data for river basins.

2. Development of software/programmes for preliminary processing of hydrologic data using micro computers.

L. Mathematical Models

1. Comparative studies of models for estimation of unit hydrograph for small catchments for a particular region and development of regional relationships.

2. Development of Hydrologic models with updating capabilities for use operational hydrologic problems alongwith satellite data.

M. General

1. History of Hydrology in India.

VIII. IRRIGATION METHODS AND WATER MANAGEMENT

1. System studies of a few selected irrigation systems.

2. Water use efficiency.

3. Drainage index-cropwise requirements of drainage.

4. Sprinkler and drip irrigation.

5. Sub-soil irrigation.

6. Development of instruments for determining soil moisture-holding capacity..

It was further suggested that a state-of-art report might be prepared on dynamic regulation of an irrigation supply system.

IX. ENVIRONMENTAL EFFECTS OF WATER RESOURCES PROJECTS

1. The study of quality of water in the Fore-Shore area, at the reservoir and immediately d/s of dam.

2. The study of meteorological changes in and around the project area, collection of data and analysis, Microclimatic changes i.e. temperature, evapotranspiration, etc.

3. Quantity and Quality of Ground Water, Ground Water balance in the command area etc. due to irrigation Projects.

4. Problem of acquatic animals (Fresh water fish vis-a-vis salt water fish) migration problem etc. and impacts on flora and fauna of the project area.

5. Studies on Thermal and Chemical pollution.

6. Effect of Reservoir on delta formation.

7. Reservoir induced Seisimicity of the Area.

X. SOCIO-ECONOMIC ASPECTS OF WATER MANAGEMENT

Irrigation and other Water Resource Projects are undertaken on the assumption that they will increase the productivity of land and thereby generate benefits. Estimates are made regarding the extent of benefits from different projects. However, our knowledge and understanding of this very important matter is rather shaky. As a result, it is found that several projects do not give the benefits which were expected of them. Instances of non-realisation of expected higher production from irrigated agriculture are not infrequent. Hence, highest priority should be given to studies dealing with impact of irrigation and other water resources projects. Impact may be broken into two parts; extent of utilisation and effect of utilisation. In either case studies may deal with measuring the extent and the determinates. Some relevant details of the above are specified below:

1. <u>Utilisation</u>

The extent of utilisation or under-utilisation of irrigation projects in different types of projects. Determine the duration of the lag between creation of irrigation potential of a project and its full utilisation. Determine the reasons of under-utilisation of created potential with special reference to socio-economic factors. Studies should go beyond the qualitative aspects and aim at having quantitative estimates of different magnitudes.

Studies may be conducted not only for major but also for minor irrigation, for different types of canals, tubewells and other sources of irrigation.

How to define and measure irrigation potential and utilisation of irrigation projects? How to reconcile the data on utilisation from land utilisation statistics and from those given by irrigation projects authorities? For this purpose, a close analysis of the area reported as irrigated under both the systems in some specific projects should be undertaken to identify the reasons for the difference. It may also be desirable to ask whether a simple categorisation into irrigated or non-irrigated area is sufficient or whether a more complex system which takes into account a number of watering is desirable.

2. Effect on Crop Productivity, Costs, Income and Employment

Determine the quantitative effect of irrigation on cropping practices, cropping pattern and crop productivity under different conditions and for both canal and tubewell irrigation. This can be known from primary data or by re-processing of the data from the crop cutting experiments.

Determine the effect on nature, composition and quantum of employment effect on migration of labour-effect on wage rates.

Determine the factors which effect the effect of irrigation on farm productivity. These may include institutional arrangements with regard to delivery schedule amount of water delivered, avoidance of wastage of water.

Determine the impact of irrigation on income of farmers. Since irrigation also increases costs, this will not be the same as effect on crop productivity. For this, detailed data on cost of cultivation would be needed. Studies resulting in evolution of some standard norms in this respect should be given adequate emphasis.

Impact on productivity may be judged in terms of per hectare of area under irrigation as well as per unit of water irrigated. The second aspect would require data on inter-crop requirement of water and respective productivity.

Irrigation also produces several secondary affects like effect on marketing, trading, crop processing, transport etc. Very little quantitative information on this is available and the same should be attempted.

Impact of irrigation on organisation of production in agriculture such as formation of co-operatives.

3. Effect on Equity

Need for the study of questions related to equitable distribution of benefits of irrigation. This will raise questions related to distribution of canal water between the head and tail and beneficiaries. This can be examined with reference to data available in the record of irrigation administration with respect to the main canal, distributaries, branches, water courses etc.

Distribution of water between farms of different size holdings would also require to be studied.

Effect on displaced persons and measures related to their rehabilitation should be studied.

4. Bench Mark Studies

Above aspects can be studied with respect to projects which have already been completed. However, sometimes it is better to conduct some Bench Mark Studies before a project is undertaken so that the data and information from such studies can be used later on for evaluating the impact of the project after its completion. Bench Mark Studies of socio-economic conditions before the start of a project may, therefore be also sponsored.

5. Review of performance of Command Area Development.

6. Effect of irrigation on yield variability-both macro and micro-studies.

7. Economics of alternative sources of irrigation and other water resource projects.

8. General

Two types of studies can be supported - Firstly, there can be evaluation of one project or part of a big project with respect to various aspects mentioned above such as utilisation of potential, delivery schedule, change in cropping pattern, cost of production and finally resulting in estimation of benefits in monetary terms. A Comparison of cost benefit ratios based on actual performance may be made with those given in project reports. Alternatively, another type of research could be one or more aspects of the impact mentioned above. These may take one or more projects having diverse, experience so as to arrive at meaningful conclusions.

In addition, some status paper requiring collection compilation and analysis of studies conducted so far may also be sponsored.

XI. SOIL MECHANICS

1. Use of lime-flyash stabilised soil to minimise cracking material characteristics to be studied in the field and laboratory and analytical study to be conducted for field application in non-critical situations.

2. Use of polymers in compacting soils

3. Soil tension studies

4. Field moisture control in earth dam construction particularly under arid zones.

5. Case of pneumatic compaction vis-a-vis conventional sheep foot roller for density moisture and speed of construction for gravelly-clay soils in earth dam construction-this is essentially a field study and might be taken up by field laboratories associated with construction and quality control of earth dams using gravelly clays.

6. Study of residual soils with specific reference to parent rock minerology on stress history, effective consolidation pressure, etc.

7. Assessment of performance of different sensing devices in vogue like diaphragm type or vibrating type in long term measurement in the field on structures.

8. Long-term stress and strain characteristics of core material in rock fill dams at high ambient pressures.

XII. ROCK MECHANICS

1. Design of safe blast pattern for minimum disturbance/vibration to the rock and to reduce consumption of explosive and fly of distance.

2. Machine performance in relation to blasting optimisation of machine utilisation.

3. Geomechanical modelling of rocks.

4. Stability of structure due to blasting.

5. Insitu stress measurement and testing equipment.

6. Field instrumentation (monitoring and observational methods).

XIII. MASONRY AND CONCRETE STRUCTURES

A. Construction

1. Vibration & other aids for improving quality of conventional masonry.

2. Optimum mortar consistency for conventional masonry construction.

3. Pre-packed masonry-construction methods materials, instrusion aids etc.

4. Impervious facing for masonry dams-concrete, gunite, polymer composites and other treatments.

B. Quality Control/Monitoring

1. Institu permeability tests as basis for quality control values & refinement of technique.

2. Other tests/criteria to assess quality of masonry during and after construction.

C. Speepage/Leaching

1. Methods of monitoring seepage pattern and pore-pressures in the body of the the dam to assess effectiveness of joint seals and drainage system.

2. Nature, extent and consequences of leaching.

D. Canal Lining

1. Effect of shrinkage/settlement cracks in rigid linings on seepage losses

E. Erosion/Cavitation

1. Nature and extent of observed damage in structures under service in relation to the hydraulic and other condition, duration of attack and type/quality of materials used

2. Protective treatment-materials & techniques

F. Durability/Weathering

1. Nature and extent of deterioration observed in structures under service in relationship to the environmental factors, duration of exposure and type/quality of material involved

G. New Materials/Processes

1. Roller compacted concrete

2. Super plasticised concrete/mortar

3. Fibre reinforced concrete-materials/application

4. Polymer composites-materials/application

5. Admixtures-development/assessment/applications

6. Grouting-materials/techniques/performance

H. Repairs/Rehabilitation

1. Materials and Techniques

2. Assessment of damage/distress

3. Assessment of effectiveness of treatment

I. Material Characteristics

1. Strength of masonry in tension

2. Fracture mechanics of concrete/masonry

3. Dynamic characteristics of mansonry

J. Structural Action

1. Mathematical modelling

2. Experimental stress analysis

3. Structural modelling with special reference to structure-foundation interaction.

K. Thermal Behaviour

1. Thermal characteristics of concrete/masonry

2. Temperature distribution and Thermal stresses

3. Minimisation/control of Thermal distress

L. Instrumentation

1. Developments releveant to masonry

XIV. NEW MATERIALS AND PROCESSES

1. Development of CNS material by appropriately stabilizing expansive back cotton soil with inorganic or organic additives

2. Development of accelerated tests to evaluate long term strength characteristics of organic grouting materials

3. Development of accelerated methods to evaluate long term strength characteristics of (a) fibre and fibre glass reinforced systems being used in reinforced earth construction and (b) effect of salt content and other chemicals on such reinforcing systems

4. Use of stabilized material for hearting and cut-offs

5. Use of plastic interceptors as hearting systems and cut-offs

6. Development of organic and inorganic injection spraying methods to prevent percolation through silty and sandy soils in canals

7. Use of plastic drains similar to geo-drains as filters in earthdams

8. Development of electro-chemical hardening material system for canal lining

9. Studies on imaginative geo-fabrics both as reinforcement and drainage systems

10. Development of half cut drains for use in expansive soils for field channels and small distributaries

11. Development of organic and inorganic injection methods to reduce percolation through masonry dams

12. Development of passive anchors for stability of hill slopes,etc.

13. Development of cut-offs by new materials and corresponding equipment

XV. APPLICATION OF SPACE TECHNOLOGY

1. Snowline and Snow area Mapping

Landsat and meteorological satellites images and digital data may be used. But frequent cloud cover is an operational difficulty. Snow melt run off model is available to predict snow melt run-off when supported by availability of other hydrometeorological data like temperature, precipitation etc.

2. Inventory of surface water bodies

Location and area of reservoirs, lakes, and ponds larger than one acre can be known. Estimations of seasonal and annual changes in area and volume of water can also be made. Landsat image and digital data may be used. Mointoring of drought and possible amelioration from the drain by planning minor irrigation structures can be done by the inventory of surface water bodies.

3. Morphometric studies

Delineation of drainage pattern morphology studies may be made using Landsat band 7, color composite and RBV images. If good amount of discharge data are made available,morphometric parameters may be correlated with discharge. Some such attempts have been made by ICAR in some Nilgiri rivers where these parameters are arrived at by conventional means.

4. River migration and stream channel position

Landsat RBV and MSS data may be used for such studies where monitoring capability is limited to the resolution of the image acquisition.

5. Overview of flood impact and damage

Landsat and meteorological satellite images may be used. But the satellite resolution is inadequate for hydraulic and detailed damage studies, but may be useful to plan other data acquisition.

6. Determination of clear water depth

Landsat digital data will be useful in this study provided a few depth measurements and observations of bottom condition are available.

7. Physical Water Quality Study

Quantitative measurement of Water turbidity including turbidity caused by plankton may be ascertained by Landsat digital and Nimbus digital data provided few concurrent ground measurements are available.

8. Groundwater studies

a) Detaction, delineation and interpretation of geologic structures are possible by using Landsat images and mosaics.

b) Exploration of shallow groundwater may be planned by interpretation of land forms, drainages pattern and density, vegetation type using Landsat images & mosaics.

c) Estimation regarding slainity of groundwater can be made from salt crust at land surface and examining their location and type alongwith density of vegetation from Landsat images and digital data. Some ground truth are essentially required.

9. Land use/Land covor

Landsat image and digital data can be used for inventory and mapping of land cover and land use. This helps to study sediment source area and to estimate the soil loss. A land cover map also gives opportunity to estimate Run-off curve number.

10. Soil moisture for a watershed

Airborne microwave radiometer is to be used alongwith ground truth for this purpose. Satellite data in this regard are not much helpful. But, calibration of microwave radiometer is a problem as it is difficult to filter out the effect of land cover, slope & other surface effects.

11. Satellite data Relay

Various physical, chemical & biological water data may be relayed through satellite. Landsat has experimental status in this regard. In view of the fact that our own scientific satellite IRS (Indian Remote Sensing Satellite) will be going up in near future, We need to design the network of DCPs (Data Collection Plateforms) inccoming days to cater for various hydrological data.

Annexure-B

EXPANSION SCHEME OF CWPRS DURING SEVENTH FIVE YEAR PLAN (1985-90)

Sl. No.	Name of Scheme	Amount (Rs. in lakhs)
1	2	3
1.	EXPANSION SCHEME OF CWPRS, PUNE	
I)	Continuing Items (Sub-Scheme)	
1.	Hydromechanics Division (UNDP)	7.81
2.	Calibration Laboratory	148.00
3.	Water and Power Information System (UNDP)	9.20
4.	Hydraulic Structures Research Centre (UNDP)	131.52
5.	Investigations Pertaining to Estuarine System	10.03
6.	Staff Colony (Phase-II)	95.05
	Total-I	401.61
II)	New Items (Sub-Scheme)	
1.	National Ship Hydrodynamic Centre (UNDP)	638.72
2.	Sediment Disposal Research	76.64
3.	Earthquake Simulation and Seismic Surveillance (UNDP/BL)	87.21
4.	Data Base Management and Integrated Information Retrievel Centre (UNDP/BL)	50.00
5.	Marine Soil Mechanics and Special Engineering Materials (UNDP/BL)	62.60
6.	Mathematical Modelling Centre for Fluvial and Ocean Hydromechanics (UNDP/BL)	26.40
7.	Centre for Studies of Density Currents and Hydraulics of Two density Thermal and Effluent Flow (UNDP)	196.50
8.	Training Cell	11.50

1	2	3
9.	Centre for Biological Control of Submerged Aquatic Weeds in Irrigation Distribution Systems	63.00
10.	Extension of Watershed Shed studies	187.85
11.	Staff Colony (Phase-III) including ancillary facilities like school, Health Unit, Marketing Centre etc.	500.00
12.	Hydroelastic Vibration Analysis Research Centre	61.00
13.	Coastal Research Vassel (UNDP/BL)	327.05
14.	Extension of Pumps Laboratory	58.00
15.	Hydraulic Design of Bridges	188.00
16.	River Training and Flood Control	160.00
17.	River Simulation Study Unit	75.00
	Total-II	2769.47

Grand Total Rs.3171.08 lakhs

Say Rs.31.71 Crores

Annexure - C

PROPOSED OUTLAY FOR THE VII FIVE YEAR PLAN
CENTRAL SECTOR SCHEMES OF CSMRS

(Rs. in lakhs)

Sl. No.	Details of Schemes	Total Outlay proposed 1985-90
1	2	3
CONTINUING SCHEMES		
1.	Expansion of CSMRS	35.00
2.	Re-organisation of CSMRS (Stage-I)	95.20
3.	Establishment of Research & Testing facilities of Rock-fill (UNDP Scheme)	1.50
4.	Establishment of Soil Dynamics Laboratory (UNDP Scheme)	3.30
5.	Facilities for Research & Testing in Rock Mechanics (UNDP Scheme)	7.20
6.	Behaviour of Concrete under High Triaxial Stresses (UNDP Scheme)	4.00
7.	Re-organisation of CSMRS (Stage-II)	575.19
8.	Development of equipment & testing facilities for soft and sensitive/swelling soils (UNDP Scheme)	
9.	Research on creep of concrete (UNDP Scheme)	14.31
10.	New Schemes with assistance from UK, USA, USSR etc.	19.12
	Total	761.39
NEW SCHEMES		
1.	Rockfill Technology Unit	59.25
2.	Foundation Treatment Division	22.10
3.	Tropical Soil Studies Division	22.70
4.	Machine Foundation Division	24.95
5.	Soil Dynamics Laboratory testing Division	17.75

1	2	3
6.	Soil Dynamics in-situ Testing Division	16.35
7.	Geo-technical Instrumentation Division	17.58
8.	Numerical Analysis and Data Centre	22.86
9.	Geo-mechanical Modelling Division	25.82
10.	Geo-technical construction Techniques	17.07
11.	Regional Rock Study Division	8.17
12.	Protective treatments Division	24.40
13.	Concrete Construction Techniques Division	29.52
14.	Concrete & Masonry Dam monitoring and Surveilance Division	33.12
15.	Multiaxial Stress Behaviour Division	3.65
16.	Environmental Study Division	30.884
17.	Corrosion Chemistry Division	16.224
18.	Soil Science Division	13.321
19.	New Materials Division	18.756
20.	Construction of Hostel Building	35.00
	Total	459.48

Grand Total Rs.1220.87 lakhs

Say Rs.12.21 Crores

CHAPTER 14

ENVIRONMENTAL IMPACTS OF WATER RESOURCES DEVELOPMENT PROJECTS

14.1 INTRODUCTION

Water is the basic resources in National Development and Conservation and efficient use of water in harmony with the environment is the need of the day. This valuable resource will become scarce by 2000 AD, with the ambitious plans of Government of India to create an overall potential of 113 million hectares. In the task of harnessing, controlling and conservation of National Water Resources, it is essential to examine every intervention in its proper perspective. Environment is one such major intervention to be reckoned with.

Construction of large reservoirs and expansion of irrigation to new areas lead to many environmental changes. A number of seminars held in India and abroad highlightee these changes. The international Commission on Irrigation and drainage (10th Congress, Athens, 1978) have observed that there should be better identification of economic evaluation of environmental impacts stemming from irrigation projects and their incorporation within planning and decision-making processes..

14.2 ENVIRONMENTAL IMPACTS OF WATER RESOURCES DEVELOPMENT PROJECTS

The environmental impacts that are the consequences of Water Resources Development Projects can be categorised as follows:

1) The impacts for which remedial measures can be adopted, such as water logging and salination in command area, submergence of human habitates, crop lands, destruction of upstream living communities (wild life, flora and fauna), acquatic environment, changes in water quality, submergence of mineral deposits, reservoir bank erosion and land slides, downstream erosion, pollution problems associated with urbanisation, implications of road constructions and socio-economic cultural problems associated with displaced population.

2) The impacts which cause reduction in the benefits of the Water Resources Development Projects but which do not have other effects such as sedimentation deposits in the reservoir, evaporation.

3) Miscellaneous impacts such as reservoir induced seismicity micro-climatic changes and water borne diseases.

14.3 REMEDIAL MEASURES

The remedial measures either to mitigate or minimise the adverse impacts on the environment caused due to construction of Water Resources Development Projects are being adopted universally. To combat the water logging and salinity problems, appropriate measures such as lining of canals, providing drainage where necessary and other improved water management techniques are being deployed. Conjunctive use of surface and ground water is also in vogue to control the water logging problem. Careful selection of proper project site reduces the displacement problems caused due to submergence of human habitate, crop lands, wild life, mineral deposits, flora and fauna, etc. Removal of the decayable material before impundment of the reservoir minimises the changes in water quality. Proper alignment of roads, strengthening the zones of weakness and soil stabilization steps would reduce the soil erosion, land slides etc. Providing adequate alternate fuel supply to the labour force in the project area would avoid unnecessary and indiscriminate felling of the trees in the project region. Carrying out periodical checks would safe-guard against mosquito breeding. Enforcing the legislation to control the discharge of untreated affluents through water pollution control boards would reduce excessive pollution into the rivers.

The impacts such as reservoir seisimicity and water borne diseases although attributed to the creation of Water Resources Development Projects are not yet fully established and still under investigation stage.

14.4 ASSESSMENT OF IMPACTS

It is a matter of interest to note that there is much discussion regarding the adverse impacts on environment due to creation of Water Resources Development Project but less is talked about the benefits accruing from the Projects. In order to know the quantum of damage created by the Water Resources Projects on environment, it is necessary to have proper devises for assessment of these impacts, so as to plan remedial measures.

The Working Group constituted by Ministry of Irrigation for laying comprehensive guidelines for preparation of detailed project reports on irrigation and multipurpose projects had dealt in their report(1) for assessing the damages. They have also outlined the sources from where the data could be collected. They suggested that; Forest Department, Indian Meteorological Department, Survey of India, Wild life Department, State Health Department, State Public Department, Botanical Survey of India and Geological Survey of India could be consulted in this respect.

14.5 RECOMMENDATIONS OF WORKING GROUP (VI PLAN) (1980-85) AND IMPLEMENTATION THEREOF

The Working Group constituted by Ministry of Irrigation major & medium irrigation projects (1980-85) had inter-alia suggested that institutes

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Note (1) Working Group Report - Guideline for preparation of detailed project of irrigation and multipurpose projects.

such as National Institute of Hydrology, Roorkee, International Institute of Environmental Engineering Nagpur should take up pilot studies on a few selected reservoirs/command area, to assess the magnitude of the problem of environment and plan remedial measures as necessary. A token provision of Rs.50 lakhs was also proposed to take-up few case studies. They further have opined that the areas such as socio-economic development and environment are not receiving adequate attention. In order to encourage the State Governments to take up the programme in these directions, they have suggested that suitable assistance may have to be provided by the Government of India on 50% matching contribution basis. Such assistance should be given for key activities such as for carrying out impact of irrigation projects on socio-economic development and environment which would include bench-mark surveys and post development assistance.

It was also noted by the Working Group that Central Water Commission would be setting up a cell to study the environmental changes. However, this has not materialised yet and the matter is under consideration with the Government of India.

Some research work relating to the changes on water quality and sedimentation have been taken up by the research stations under the programme of research schemes applied to reservoir valley projects sponsored by Central Board of Irrigation and Power. No up-to-date information is available on the effects of Water Resources Projects on other environmental factors.

14.6 RECOMMENDATIONS FOR IMPLEMENTATION DURING VII PLAN

As stated in earlier paras it is of paramount importance to assess the damages on environment due to Water Resources Development Projects. As such it may be necessary that the reputed institutes of the country dealing with hydrology and environment may take up research studies to quantify the environmental damages and plan remedial measures. A provision of 100 lakhs for the above work is suggested.

The works of studying impact of irrigation projects on environment through bench-mark surveys and post development assessed may be carried out for which suitable assistance may be provided by the Centre on 50% matching contribution. A provision of Rs. 2 Crores is suggested.

The State Governments may be advised to set up environmental cells in their planning departments. This would help greatly the framing of the project reports taking the environmental impacts into consideration.

It is strongly recommended that an environmental cell should start functioning in Central Water Commission at the earliest. This cell in addition to studying the environmental impacts of the Water Resources Development Projects received in Central Water Commission for technical examination would also co-ordinate with the department of environment where necessary.

Various steps have been taken up by the Government of India and State Governments for prevention of pollution. Also, a programme for monitoring the quality of river waters in selected river basins were undertaken. Legislation to control the discharge of untreated affluents had also been enacted and water pollution control boards had been set-up to enforce it.

However, unless the State Governments enforce these laws strictly the excessive pollution into the river will remain unchecked. Similarly the authorities responsible for maintenance of forests should strictly enforce forest laws.

Most of the environmental impacts offer themselves to be quantified. These can be incorporated in the planning model by deploying suitable techniques such as multi-objective system analysis. It may be suggested that institutes like Central Water Commission, Indian Institute of Technologies etc. may be encouraged to take up systems engineering studies with the objective of maximising the benefits of water resources development projects and minimising the environmental impacts.

14.7 SOCIO-ECONOMIC IMPACTS

The socio-economic impact of the change in environs is basically a human problem as it affects the habitation of the population dwelling in the area and their livelihood pattern. The reservoirs and connected works of the projects displaces a large section of population, very often tribal. Payment of compensation for land and assets is not sufficient in such cases. The displaced people are also to be rehabilitated and provided with a livelihood. The problem becomes more difficult when the livelihood pattern the displaced persons are forced to adopt is different from that they were pursuing previously. The fact that the benefits of the projects usually goes to people living away from the site and not to the displaced persons also create resentment among them. A very humane approach with lot of understanding is therefore needed to tackle the problem. Besides making suitable alternative livelihood available to them, all the facilities of modern life like education, health etc. will have to be extended to them so that they do not generate the feeling that they are displaced and left stranded. In short the execution of the project should also, ultimately, turn to be a benefit to them instead of a bane.

The Working Group strongly recommended that firm guidelines in this regard be evolved under the aegis of a multi-disciplinary committee comprising of agriculturists, economists, sociologists etc. and they are effectively implemented.

The Working Group strongly recommends the discussion of this problem at all high levels forums and also urges that top most priority be given to these aspects. In this connection the Broad Guidelines framed by the Ministry of Home Affairs in connection with the rehabilitation of displaced tribals on account of location of Irrigation, Industrial and Mining projects as well as other development activities may be kept in view. Salient aspects of the recommendations are reproduced below:

i) In no case tribals should be evicted without making payment of full compensation for the land;

ii) In view of the operation of various protective enactments, open transactions in land are not many and, in any event, do not reflect its market value or even its potential. Hence, a new formula needs to be devised to provide satisfactory quantum of compensation to the tribals for land required. This could be based, inter alia, on

capitalised income value. The compensation amount might be deposited in banks preferably in long-term deposit so that the tribal family can derive a minimum income from the money. In case, a tribal family indicates inclination to buy land elsewhere with the compensation amount, they should be assisted in doing so by the administration which should ensure that the alternative becomes a sustained source of income.

iii) Emergency measures should not be undertaken for acquisition. Further, "public purpose" should be properly defined and restrictions should be placed on excessive acquisition of land;

iv) For tribals there is no rehabilitation more effective than providing them with land as the source of livelihood. Even if the quantum of land lost by tribal family cannot be entirely made good by alternative land, it must be ensured that some land is provided so that the family is not completely uprooted from its traditional occupation;

v) State Governments might enact law similar to the Maharashtra law which provides for grant of land in the command area of an irrigation projects to a family displaced on account of execution of this project.

vi) Project report for settlement of local communities should be prepared well in advance, keeping in view their present socio-economic status, the cultural profile, the anthrol of perspective development and their present skill and situation besides absorption capacity.

vii) The displaced tribals should be rehabilitated not as individuals but as community, as far as possible. Advance Planning by sensitive officers specially charged with the task should be done. Additional financial expenditure should be provided in the project report prepared for this purpose.

viii) If land cannot be provided, employment should be provided at least one member of a tribal family to insulate the family from forces tending to uproot it. In order to ensure this, the members of families should first be put on the rolls of the project and, if necessary, send for the requisite training. The necessary educational grounding should also be given as required in the circumstances. If all the displaced families cannot be accommodated within the project, efforts should be made to find jobs in other sister projects as well as in the State Governments;

ix) A substantial training programme of entrepreneurial skills, with follow up in helping and getting financial support marketing outlets, supply of raw-material etc. should be built up;

x) Provision of drinking water with protected water supply scheme for such newly established rehabilitation centres must be ensured;

xi) Provision of free house sites to the affected families where the houses of displaced families have also been acquired, should form part of any rehabilitation scheme. House-site plots duly developed

must be made available to each family with sufficient space for community purpose; a village chawdi or chopal, medical centre, etc. are necessary.

14.8 CONCLUSIONS

It is foregone conclusion that the benefits accrued from water resources development projects and the adverse impacts on Environments cannot be viewed in isolation. What is to be considered is whether the gains from the proposed development would substantially outweigh the adverse environmental impacts or whether the environment would be able to absorb this impact without progressive deterioration. This is more so in the developing countries where the entire exercise of the economic development is essentially for improving the quality of life of the otherwise under-privileged sections of society. Nevertheless, the adverse impacts of development works on the environment should be kept as low as possible and efforts should be taken to protect the environment to the extent possible.

CHAPTER 15

WATER MANAGEMENT

Irrigated agriculture is the major consumer of the water in India. Its demand in other sectors is also progressively growing. Water is, however, a scarce commodity, so much so, that by the turn of the century it may be a critical resource to mankind and, therefore, to be husbanded in a most scientific and efficient manner. The population of India is about 685 million and is expected to increase to about 900 million by 2000 A.D. The country must increase its agricultural production in order to meet the demands of the growing population. This can be achieved by bringing more and more land under irrigation and increase yields through improved inputs in seeds and fertilizers.

Huge investments are being made by the country in irrigation development including rehabilitation of old systems. Over two million hectares of new irrigation command are added yearly through surface and ground water irrigation system. By continuing and quickening this pace, the country would develop its ultimate irrigation potential of 113 m.ha. by the turn of the century. After this has been achieved, further increase in agricultural production will have to be achieved entirely by technical and water management.

While the creation of potential is going a pace, the efficiency of water use has not received adequate attention. On an average, only about 25% of the water diverted for irrigation is eventually used by the crops in the fields. The yield from irrigated agriculture in our country is also very low by world standards, being in the range of 1.7 million ton/ha. whereas there is scope to increase this figure to 4 to 5 million ton per ha. based on achievements made in Indian irrigated pilot farms where good water management and crop husbandary practices have been followed as well as results obtained in other developing countries. The performance of individual irrigation systems is to be made more efficient by reducing losses so that a higher proportion of the water diverted/captured is delivered to the crops and more food is grown with each unit of water delivered. Such increase would make extension of irrigation possible to more unirrigated land in addition to raising the returns on the investments made.

Concerted effort will have to be directed towards realising the potential for increasing the efficiency and effectiveness of irrigation by mounting an intensive attack on the real problems of operating systems as well as following various practices for better water use. A new culture of irrigation water management has to be developed for practice by all who are involved in irrigated

agriculture right from policy makers and administrators, to professionals and farmers to achieve this goal.

TRAINING IN IRRIGATION WATER MANAGEMENT

Modern trends in irrigation management is a fairly new concept in India and personnel with necessary specialised skills in water management is not available. A first and foremost step towards better irrigation water management would be to train professionals at all levels involved in irrigated agriculture, village level extension workers and the farmers in the efficient and economic use of scarce irrigation water for maximising efficiency and productivity keeping in view the various physical constraints and with special emphasis to the farmers needs. These trainings will be directed to transfer of technology at appropriate levels to increase operational efficiency of irrigation systems as well as to increase the productivity from unit quantity of water use for irrigation and per land area irrigated. Complementary support would also have to be provided by research and diagnostic analysis on the existing irrigation systems and to evolve suitable measures for improvement.

With a large irrigated area already in existence and the projected rapid increase in their extension a large number of trained personnel for efficient water management is of vital necessity. A study of the International Food Policy Institute (1979) estimated that a total of 43,000 additional professionals, technicians and extension workers are needed in India for new projects along. Another estimate, comprising new and old system suggests that total training needs for professionals are about 150,000 over the next decade.

Establishment of and running of State level Water and Land Management Training Institute in all the States with major and medium irrigation projects in operation/planning should therefore be accorded high priority. In view of the magnitude and depth of the problem involved, it would be desirable to provide suitable courses at the under graduate levels to focus greater attention on irrigation water management in addition to the in-service training facilities contemplated through Water Management Institutes and the Central Training facilities.

The need for setting up training institutes for training irrigation personnel has been fully recognised for quite some time. Action has been taken by the State and Central Governments for establishing water and Land Management Training Institutes in a number of States with the primary objective of providing training to the in service professionals in water management and carrying out field action research to locate deficiencies and evolve methods for improvement of the systems as well as for training needs. The training will cover water conveyance, delivery, on farm water management, command Area Development, Water scheduling, soil-crop water relationship etc. and in addition, other topics on water resources development and management including agricultural practices agricultural economics, socio-economic aspects etc. Proper use of high yielding variety of seeds, fertilizers, pesticides etc., will also be covered.

Water and Land Management Institutes have been set up in the State of Maharashtra, Gujarat with World Bank support. These are being strengthened with USAID-assistance. Government of Andhra Pradesh has also set up WALMI at Hyderabad. Water and Land Management Training Institutes are being set up in

Madhya Pradesh, Rajasthan, and Tamil Nadu under a recently commissioned "Irrigation Management and Training" Project operated with USAID support. Action to set up similar Training Institute in other States is also being taken.

At the Centre the ICAR has established two water Technology Centres one at New Delhi and another at Coimbatore to promote training and research in better water use management.

The estimated cost of setting up/running about 20 Institutes all over the country during the Seventh Plan period would be about Rs.100 crores.

PROPOSAL FOR SETTING UP NATIONAL IRRIGATION MANAGEMENT INSTITUTE AT THE CENTRE

The need for a Central apex body to assist the State Governments in evolving methodologies for better water use management with a multi-disciplinary system approach and over viewing its implementation has been fully recognised. The Committee of Secretaries which discussed the establishment of International Irrigation Management Institute in India has recommended the establishment of National Institute for Irrigation Management in view of the greater professionalisation of water resources management and the need for developing methodologies for improving irrigation efficiency on-farm WM practices and various engineering interventions relating to water conveyance, water scheduling, agronomic conditions, socio-economic impact etc. dissemination of information etc.

The above Institute with a multi-disciplinary system approach shall study existing irrigation systems as a whole covering performance evaluation, diagnostic analysis, evolving solutions and provide technology transfer, and other necessary innovative interventions for better water use management.

The cost of setting up the Institute and running the same over a 6 years period is estimated as about Rs.10 crores.

SPECIAL CADRE FOR WATER MANAGEMENT

Efficient management of an irrigation system will depend on proper design, construction, operation and maintenance which is a multidisciplinary concern of engineers, agronomists, geologists, sociologists, farmers etc. A coordinated inter-disciplinary inter-action between the policy makers/planners and the professionals & farmers should be an integral part of a successful water management programme. A special Water Management wing with trained personnel should be in charge of the Water Management functions both at the States and at the Centre so that the fruits of investments made in the sector of Irrigation agriculture is full reaped. This group will not only oversee and ensure efficient use of water conserved for irrigation but also interact with other related activities such as planning, design, construction etc. with a view to provide adequate provisions for efficient water management in new projects.

CHAPTER 16

SOME POLICY ISSUES

Some of the Policy Issues have been mentioned in brief under Chapter 4 "Approach and Strategy for the 7th Plan". Policy issues have been framed in the past by the various organisations. The Irrigation Commission (1972) and the Agricultural Commission (1976) have brought out the policies to be followed in the Irrigation sector. Some of their recommendations have been accepted. The report of the Working Group on Major and Medium Irrigation for the Sixth Plan and also the Sixth Plan documents have also mentioned about the policy issues. The Conferences of State Ministers of Irrigation constantly review the major policy issues and adopt resolutions on some of them. The Public Accounts Committee of Parliament which recently examined the Planning Commission in relation to its planning process & monitoring mechanism with reference to irrigation projects had occasion to assess, review and recommend major policy recommendations. The approach of the 7th Five Year Plan 1985-90 by the Planning Commission, placed before Parliament in August, 1984 has also reviewed the policy in relation to irrigation. Taking into consideration all these policy pronouncements, some of the important issues in respect of the strategy to be adopted for the 7th Plan of which Govt. of India may have to take specific decisions are enuniciated in this chapter.

16.2 FRESH CLEARANCE FOR ALL ONGOING PROJECTS

The approach as brought out in the approach paper for Seventh Plan indicates that the main aspect of the strategy for the Seventh Plan will be to consolidate the gains from the investments already made in the irrigation sector and to improve the productivity from the investments made so far in this important sector of activity. This requires that the projects in progress and particularly major and medium irrigation project involving all investments and longer gestation period would be completed in a time bound manner. This will require that the States follow a vigorous financial and implementation discipline so that the major and medium ongoing projects are completed in a time bound manner with a view to maximising the gains. A closer look will have to be given to the implementation schedule of all the ongoing projects. As a matter of fact there should be project by project exercise to be done by the States so that the scarce financial resources are allocated on priority to the project that will afford quicker benefits. In this exercise the Planning and Financial Departments of the States must be involved fully. As at present this involvement does not seem to be adequate. The Planning Commission may also consider taking a fresh look at these projects, their cost and implementation schedule and give fresh clearance to them on the basis of their updated costs. Till this is done no new project of magnitude may be considered

for clearance for implementation by the States unless the State will be in a position to clearly demonstrate to the Planning Commission that the resources required for the project to the time-schedule are available.

16.3 EARMARKING OF PROVISION FOR ALL ONGOING PROJECTS

The approach to the Seventh Plan also specified that new starts should be limited to medium projects benefiting drought prone areas, tribal areas, backward areas and to minor irrigation schemes. Even in this respect the implementation programme may have to be time bound with a clear assurance from the States that they will make available the resources required to achieve the physical implementation schedule.

This will require that all the ongoing projects for the Seventh Plan are earmarked and their earmarking is vigorously enforced. This will require that Planning Commission be armed with the necessary authority to enforce this discipline.

16.4 ANNUAL UPDATING OF COSTS AND FRESH CLEARANCE EVERY FIVE YEARS

The escalation of the projects that take place causes one of the important distortions. The question of the escalation in irrigation projects have been gone into by the Naegawala Committee (1972). The reasons for escalation in the cost of the projects even as of date continue to remain much the same. One fact that was noticed during the Sixth Plan implementation was that the States do not regularly update the costs of the project. To meet with this deficiency in part it is suggested that the cost of the project from the date of sanction should continue to be updated by adding 10% of the spillover cost every year. This should be the standard exercise to be adopted every year. The Planning Commission have also directed that whenever the scope of the project has changed or the cost exceeds 10% of sanctioned cost or Rs.2 crores whichever is less a fresh clearance of the project should be obtained. The States do not appear to follow this. It is therefore necessary that the States are required to obtain fresh clearance for all spillover projects from the Planning Commission in every Plan.

16.5 TWO STAGE CLEARANCE TO PROJECTS

The Planning Commission should also consider giving a two phase clearance of the projects. One on the basis of techno-economic evaluation to be followed by clearance for implementation. When clearance for implementation is being considered the implementation plan for the project to be completed will have to be prepared by the States' Irrigation Finance and Planning Department wherein physical targets for completion of the project would have been specified and based on which financial provisions are earmarked for implementation. At successive annual plan discussions the physical plan of implementation will be discussed and finances provided for achievement of the physical targets.

16.6 ACCOUNTING FOR ESCALATION IN ANNUAL ALLOCATIONS

The Working Group report is based on fixed prices with 1984-85 as a base. For all the major and medium projects accurate assessment of up-dated cost estimates of the projects were not available.

As stated in chapter 8 effort has been made to up-date the costs as far as practicable. However preparation of the Plan on the basis of fixed cost and not allocating resources taking into consideration the escalation that takes place during the period of the plan causes further distortion in the plan achievements. It is therefore necessary for the Planning Commission to consider making available the resources on the basis of Annual escalation which may be accounted for at the rate of 10% per year so that allocation in real terms do not get eroded.

16.7 INTER-STATE (JOINT) PROJECTS

Many of the Inter-state problems of sharing of water have been resolved by mutual negotiation amongst the States through the good offices of the Ministry of Irrigation. While resolving such problem it was inevitable that some of the projects had to be the joint projects of the States. Examples of such joint projects are Rajghat Dam Project, Bansagar Dam Project, Subarnarekha Project. It is seen that for various reasons the States have not been able to provide adequate allocation for their projects with the result that the projects go on lingering. In the overall national interests such joint projects are not allowed to linger on, and are completed on jointly. However, to assist and also to pursuade the States to provide adequate allocation to such projects, it is suggested that the Central Government may finance 50% of the cost of such joint components with the stipulation that these projects would be implemented as per direction of the joint boards under the Ministry of Irrigation & the State Ministries. This 50% of the expenses for implementation would be financed by the centre as special or advance plan assistance and the rest 50% will have to be provided for by the States as per their share. This will be a first charge on their plan resources and if they do not provide this resource from their budgets the shortages would be directly allocated to the projects from the Central Block Grants to the States. Under such stipulation the allocation required for Rajghat, Bansagar, Subarnarekha Projects in the 7th Plan in the Central Sector would be about Rs.500 crores.

16.8 MONITORING OF PROJECTS

The programme of monitoring major projects will be continued and further strengthened to include more number of major projects to make this monitoring more effective. The monitoring will be done at all three stages of the projects, namely, the stage of pre-construction investigations the construction stage and the stage of post construction/operation.

16.9 UTILISATION OF IRRIGATION POTENTIAL - LAG IN UTILISATION

The Working Group report proposes that by the Major and Medium Irrigation Projects a potential of 37.5 M.ha. will have been created by the end of the 7th Plan. It is envisaged that about 32.5 M.ha. of the potential will have been utilised by the end of 7th Plan. Appropriate strategies will have to be adopted under the CAD Sector to reduce the lag of 5 M.ha. Therefore the utilisation of the created irrigation potential will have to receive the highest priority through construction of field channels and water courses and the early completion of command area development projects. Multi-disciplinary teams shall be set up in the command area of all projects to ensure intergrated development of all aspects. Emphasis will be given to the software inputs and the organisational aspects, for the improved irrigation services to the

beneficiaries. It has been decided that for all new projects the channels should be taken down to 5 to 8 ha. This decision may have to be formally conveyed to the States by the Planning Commission. However, due to this change for some of the ongoing projects of the VIth Plan some channels from the 40 ha. limit of the Sixth Plan to the new limit 5 to 8 ha. limit will continue to be constructed at the cost of cultivators. With a view to ensure that the change over to the new standards is smooth, the cost of channel from 40 ha. to 5/8 ha. limit for ongoing projects may be considered for being financed by the centre on a 50:50 basis. The Working Group on CAD has made this suggestion. This Working Group supports this suggestion.

16.10 MAINTENANCE OF EXISTING SYSTEM

Maintenance of existing irrigation system is not getting the attention of the States as required. The main reason for this is seen to be inadequate allocation made available by the States. The Ministry of Irrigation had indicated to the 8th Finance Commission that for adequate maintenance of the system at least Rs.100/ha of C.C.A. or annual irrigation whichever is higher plus at least 20% of special repairs will have to be provided by the States. In addition the establishment cost for operation and management of the system was anticipated to be Rs.58/ha. Somehow or the other the 8th Finance Commission has not accepted this recommendation. We are unable to appreciate the reasons given by the Finance Commission by providing Rs.100/ha. including establishment charges. In our opinion this will prove to be too inadequate for proper maintenance of the systems. We recommend that not only O&M expenses may be provided at Rs.170/ha. but mechanism may have to be created to ensure that this resource is earmarked for maintenance and not allowed to be diverted to other sections of activity and that unspent balance should be made available for the next year. While proposing these allocations there is also need to take into account escalations and provide adequate increase to offset these.

16.11 NATIONAL INSTITUTE FOR MANAGEMENT OF IRRIGATION

In the 7th and subsequent plans increasing production of irrigated agriculture will have to be given continued attention. Some measures for this will be seen in the report of working groups on CAD. It must however be stressed here that increased attention will have to be given to efficient water management. This would require appropriate training programmes to impart intensive training in water management to all field staff and even the beneficiaries. Already Ministry of Irrigation have taken steps to create Water and Land Management Institute in some of the States. More States may be expected to follow suit. It is however necessary to have a national institute for management of irrigation as apex institute which will work as a think tank. In the country to guide the states on all problems of management of the system. Already this proposal is accepted in principle and the details are being worked out. The Central Sector programme for major and medium irrigation provides for the NIMI.

16.12 HYDROLOGICAL NET WORK

The Ministry of Irrigation through Central Water Commission is maintaining a net work of key gauge observation and discharged measurement sites on many of the important rivers. These sites provide reliable data for

evaluating the water resources potentials of the basins. The data obtained is also useful to sort out many inter-state water sharing problems. It is necessary to expand this activity to other basins as well as increase the intensity of these stations so as to bring these on par with recommendation of the World Meteorological Organisation. Some of the sites may have to be upgraded. Since these observations will generate the basic data required for planning and utilisation of water resources on a continuing basis these should form permanent activity of the Government of India on the lines similar to that of IMD. The observation and monitoring of the quality of water will henceforth have to be given continued and increasing attention. The hydrological network should be appropriately strengthened to undertake this activity at all gauging sites.

16.13 INVESTIGATIONS OF PROJECTS BY THE STATES

It is seen that out of the total estimated potential from major and medium irrigation projects of 58.5 M.ha. states have identified projects to the tune of 53.5 M.ha. The remaining projects are yet to be identified. Even for some of the identified projects the detailed investigations have not been done by the States. Since no new project is to be taken up in the 7th Plan it is desirable that the States complete the investigations of these projects during the 7th Plan. We have been urging the States to keep CWC associated with the investigation of the projects. The response of the States to this suggestion is not encouraging. Further since the accent in the 7th Plan will be for consolidation of the gains the states are likely to neglect the activity of investigation which is not desirable in the overall National interest. In order to pursuade the states to continue this activity and also ensure that the CWC is involved in the projects at formulation stage it is suggested that the activity of investigation of major and medium projects be financed by the centre as a centrally sponsored activity. Towards this end the Central Sector programme provided Rs.100 crores during the plan.

16.14 REHABILITATION OF OUSTEES

Rehabilitation of oustees and specially the tribals may pose a problem in future projects. It is increasingly realised that the problem of oustees should not be dealt with as a mere acquisition problem. It is being now recognised to be a human problem and needs to be dealt with as such. Some discussions on the guidelines to be considered in this regard are already initiated. Maharashtra Rehabilitation Act as well as the direction of the Narmada Water Disputes Tribunal could form a direction in which the efforts needs to be pursued. It should be recognised that the oustees should be able to share in the benefit of the prosperity the project is expected to bring to the society. At times especially for tribal oustees it may be necessary to rehabilitate them on the reservoir fringe by making exceptions from the Forest Conservation Act 1980 and also by providing appropriate productive system to rehabilitate them at the cost of the projects. This would need special attention at the Central level.

16.15 ENVIRONMENTAL IMPACT

Recently increasing attention is being paid and rightly so to assist the environmental impact of the project. However while this is being done only the irrigation side of the impact is being analysed. It is easily realised that any developmental activity will cause some damage to the existing environment. What is required to be ensured is that this does not cause a progressive degradation of environment and a new equilibrium is established.

In all these processes well being of humanity should be the Central point around which the impact assessment would revlve. Taking into consideration the Central theme of economic development of raising the economic standards of the multitudes of rural and poverty sticken population it is necessary that a pragmatic approach to the problems of environmental management is required.

16.16 Above were listed out some of the issues which would need close and careful attention of the Government of India in formulating a 7th Five Year Plan. It is hoped that the Government will consider these with all the attention they deserved and take appropriate decision for a meaningful finalisation and implementation of the 7th Five Year Plan.

ANNEXURES

ANNEXURES


सत्यमेव जयते

Annexure I

No.24(1)/83-I&CAD
Government of India
Planning Commission

Yojna Bhavan,
Sansad Marg,

New Delhi, the 16th July, 19

OFFICE MEMORANDUM

SUB: CONSTITUTION OF A WORKING GROUP ON MAJOR & MEDIUM IRRIGATION PROGRAMME FOR THE SEVENTH FIVE YEAR PLAN.

With a view to formulate the draft Seventh Five Year Plan (1985-90), it has been decided to set up a Working Group on Major and Medium Irrigation Programme with the following composition:-

1)	Secretary, Min. of Irrigation	...	Chairman
2)	Chairman, Central Water Commission	...	Member
3)	Additional Secretary, Ministry of Irrigation	...	"
4)	Joint Secretary (GB), Ministry of Irrigation	...	"
5)	Joint Secretary (Indus), Ministry of Irrigation	...	"
6)	Financial Adviser, Ministry of Irrigation	...	"
7)	Member, Joint River Commission	...	"
8)	Member, (Water Resources) Central Water Commission	...	"
9)	Chairman, Central Ground Water Board, Ministry of Irrigation	...	"
10)	Adviser (I&CAD), Planning Commission	...	"
11)	Joint Adviser (I&CAD), Planning Commission	...	"
12)	Project Director, Water Technology Centre, Indian Agriculture Research Institute, New Delhi	...	"
13)	Agricultural Commissioner, Ministry of Agriculture, Department of Agriculture & Co-operation	...	"

14)	Economic & Statistical Adviser, Ministry of Agriculture, Directorate of Economics & Statistics	...	Member
15)	Chief Engineer (Mon.I/II/III), Central Water Commission	...	"
16)	Chief Engineer (TE), Central Water Commission	...	"
17)	Chief Engineer (CMO), Central Water Commission	...	"
18)	Director, Department of Environment	...	"
19)	Director, Central Water & Power Research Station, Pune	...	"
20)	Director, Department of Economic Affairs, Ministry of Finance	...	"
21)	Member-Secretary, Central Board of Irrigation & Power	...	"
22)	Member (P&P), Central Water Commission	...	Convenor

The terms of reference of the Working Group will be as follows:-

i) To carry out a review of the performance, in terms of physical and financial targets, in the Sixth Five Year Plan State-wise. The performance of the Central Sector Scheme will also be reviewed.

ii) To formulate proposals for the Seventh Five Year Plan (1985-90) in terms of physical targets and financial investments yearwise for the 5 year period for each State and for schemes in the Central Sector. The Group should specially keep in view the implementation capacities of the concerned organisations, requirements of essential construction materials like cement, steel, coal,diesel, explosives, etc. The carry-over of investment on on-going schemes will be worked out and proposals made for completing as many ongoing schemes as possible by the end of the Seventh Plan period. In formulating the proposals, a 20-year perspective may be kept in view and also the targets set under the national perspective for water resources development prepared by the Ministry of Irrigation. The needs of the 20-Point Programme should be duly considered in making the projections for the targets of benefits for the Five Year Plan. The needs of drought-prone, tribal backward areas and special component plans for Scheduled Castes and Scheduled Tribes both in terms of financial investment and physical targets may be specifically taken into account and the priorities for development indicated.

iii) To propose measures for ensuring that adequate out-lays are provided by each of the States concerned for the construction of Inter-State Projects.

iv) To suggest measures for ensuring that State Governments draw up Master Plans for irrigation, in respect of their territories, before the end of the Seventh Plan.

v) To prepare a science and technology plan for the irrigation sector so that S&T Programme could be evolved suitably.

vi) To examine the recommendations of the Public Accounts Committee made in 141st Report (1982-83) (Seventh Lok Sabha) and recommend such changes in the content of the irrigation development programme for the Seventh Five Year Plan.

vii) To recommend strategy and measures for improving the efficiency of existing irrigation systems including the programme for modernisation of the old irrigation projects. The investment for the modernisation programme, which should include the extension of the distribution from 40 hectares block to 5/8 ha. blocks in the completed irrigation projects, may be specifically indicated with a suitable programme of phasing of the investment. A perspective programme may be drawn up for modernisation of the old irrigation systems indicating the priorities in various States so as to enable priority schemes to be taken up in the Five Year Plan period. The changes required in the irrigation practices and procedures in consonance with the requirement of modern agriculture may be taken into account in modernisation of the projects.

viii) To suggest measures for minimising conveyance losses in the main canals and the distribution systems and for promoting equitable distribution of water in the entire command of the irrigation projects.

ix) To recommend appropriate strategies and measures for successful implementation of the Five Year Plan on the basis of a malady-remedy analysis, which would include recommendations of personnel policies to help minimise the adverse impact, administrative managerial constraints in the implementation of the programme.

x) To recommend suitable measures for reducing the losses from irrigation works, particularly the need for stepping up revenue from irrigation works to cover not only operation and maintenance charges fully, but also interest charges on investment. The recommendations of the Eighth Finance Commission may be taken into consideration if the Report thereof is available by them.

xi) To assess the additional employment during the construction and operational stages of various categories of personnel and the training needs for implementation of the plan.

The Working Group may coopt representatives of the State Governments or other agencies as may be required.

The Working Group shall submit its final report to the Planning Commission by 31st January, 1984.

Sd/-
(N.K.Dikshit)
Joint Adviser (I&CAD)

LIST OF ADDITIONAL MEMBERS SUBSEQUENTLY INCLUDED

1. Dr. S.C. Maudgal, Director(EB), Department of Environment, Bikaner House, Shahjahan Road, New Delhi

2. Sh. K.P. Geetakrishnan, Jt.Secretary (Plan Finance), Department of Expenditure, Ministry of Finance

3. Sh. P. Tripathy, Jt. Secretary(Tribal Development), Ministry of Home Affairs

4. Sh. B.K. Sarkar, Jt. Secretary, (SC & BCD), Ministry of Home Affairs

5. Sh. Arvind Varma, Secretary, Irrigation & Power Department, Government of Uttar Pradesh, Lucknow

6. Sh. A. Choudhury, Secretary, Irrigation & Flood Control, Government of Assam, Dispur

7. Sh. Balakrishna, Secretary, Irrigation & Power Department, Government of Punjab, Chandigarh

8. Sh. Kamla Prasad, Commissioner & Secretary, Irrigation Department, Government of Bihar, Patna

9. Sh. Ajoy Shankar, Special Secretary, Irrigation Department, Government of M.P., Bhopal

10. Sh. P.A. Raj, Secretary, Irrigation Department, Government of Gujarat, Gandhinagar

11. Sh. K.V. Natarajan, Secretary, Irrigation Department, Government of A.P., Hyderabad

Annexure II

STATE WISE REVIEW OF PERFORMANCE
DURING THE SIXTH PLAN (1980-85)

Rs.Crore/000 ha.

Sl. No.	Name of State	Expenditure		Potential		
		Plan out-lay	Antici-pated	VIth plan target	Antici-pated creation by the end of VI Plan	Anticipated utilisation
1	2	3	4	5	6	7
1.	Andhra Pradesh	791.29	717.79	520	521.00	471.00
2.	Assam	62.50	70.30	119	51.00	43.00
3.	Bihar	850.00	692.42	665	427.00	519.00
4.	Gujarat	980.00	872.74	260	294.00	251.00
5.	Haryana	362.25	293.86	151	159.00	112.00
6.	Himachal Pradesh	10.45	6.64	6	6.00	4.00
7.	Jammu and Kashmir	60.94	54.54	40	32.00	21.00
8.	Karnataka	440.50	422.95	400	228.00	209.00
9.	Kerala	256.05	252.79	208	104.00	104.00
10.	Madhya Pradesh	780.00	702.31	533	363.00	175.00
11.	Maharashtra	1138.66	1233.74	550	560.00	488.00
12.	Manipur	40.00	37.28	46	35.00	23.00
13.	Meghalaya	1.00	0.10	-	-	-
14.	Orissa	360.00	344.36	254	145.00	117.00
15.	Punjab	277.29	213.97	170	158.00	139.00
16.	Rajasthan	375.00	358.10	332	330.00	216.00
17.	Tamil Nadu	149.79	161.21	66	73.00	60.00
18.	Tripura	19.00	16.85	3	-	-
19.	U.P.	1049.74	914.39	1200	799.00	578.00

1	2	3	4	5	6	7
20.	West Bengal	240.00	157.51	197	120.00	104.00
21.	Arunachal Pradesh	2.00	1.31	-		
22.	Dadra Nagar Haveli	9.00	13.86	21		
23.	Delhi	4.10	0.70			
24.	Goa, Daman, Diu	40.00	44.06			
25.	Pondicherry	1.30	1.54			
	Total	56.90	61.87	5741	4405	3634
	Central Sector	90.00	27.98	-	-	-
	Grand Total	8391.36	7613.30	5741	4405	3634

MAJOR ON-GOING PROJECTS OF VI PLAN

Sl. No.	Name of State/Project
1	2
	I Plan Schemes (11 Nos)
1.	Kosi Barrage & Eastern Kosi Canal(C)
	GUJARAT
2.	Kakrapar (C)
3.	Mahi Stage I (C)
	HARYANA
4.	Western Jamuna Canal (Remodelling)
	KARNATAKA
5.	Tungabhadra RBC & LBC (C)
6.	Bhadra (C)
	II Plan Schemes (13 Nos.)
	ANDHRA PRADESH
1.	Nagarjunasagar
	GUJARAT
2.	Mahi Stg. II Kadana (C)
	KERALA
3.	Periyar Valley
	MADHYA PRADESH
4.	Barna (C)
5.	Tawa (C)
	MAHARASHTRA
6.	Bagh (C)
7.	Itiadeh (C)
	MADHYA PRADESH
7.	Chambal
8.	Bhandar Canal (C)
	ORISSA
9.	Mahanadi Delta (C)
	WEST BENGAL
10.	D.V.C. System
11.	Mayurakshi (C)
	MADHYA PRADESH
8.	Mula (C)
9.	Khandakwasla
	ORISSA
10.	Salandi (C)
	RAJASTHAN
11.	Rajasthan Canal Stg.I
	UTTAR PRADESH
12.	Ramganga (C)
	WEST BENGAL
13.	Kangsabati

1	2

III Plan Schemes (24 Nos.)

	ANDHRA PRADESH
1.	Sriramsagar
	BIHAR
2.	Western Kosi Canal
3.	Rajpur Canal (C)
4.	Gandak (C)
	GUJARAT
5.	Ukai
	HARYANA
6.	Gurgaon Canal
	KARNATAKA
7.	Malaprabha
	KERALA
8.	Pamba
9.	Kuttiadi
10.	Chittrupunzha
11.	Kanhirapuzha
12.	Pazhassi

1	2
	MAHARASHTRA
13.	Jayakwadi St. I
14.	Bhima
15.	Kal (C)
16.	Tulshi (C)
17.	Krishna
	PUNJAB
18.	Beas Unit I
19.	Beas Unit II
20.	Extn. of non-perennial Irrigation UBDC Tract.
	RAJASTHAN
21.	Jakham
	TAMIL NADU
22.	Parambikulam Aliyar (C)
23.	Chittarpattanamkal (C)
	UTTAR PRADESH
24.	Sarda Sahayak

Schemes of Annual Plan (1966-69) (10 Nos.)

	BIHAR
1.	Sone H.L.C. (C)
	KARNATAKA
2.	Tungabhadra H.L.C.
3.	Hemavathi (N.P.)
	KERALA
4.	Kallada
	MAHARASHTRA
5.	Kukadi
6.	Upper Godavari

	MADHYA PRADESH
7.	Haddeo RBC (C)
	PUNJAB
8.	Utilisation of surplus Ravi Beas Waters
	TAMIL NADU
9.	Modernisation of Vaigai Canal(C)
	UTTAR PRADESH
10.	Kosi Irrigation (C)

1	2

IV Plan (1969-74) Schemes (30 Nos.)

ANDHRA PRADESH

1. Godavari Barrage (C)
2. Vamsadhara St.I

BIHAR

3. Bagmati

GUJARAT

4. Sabarmati
5. Panam
6. Damanganga

HARYANA

7. Loharu Lift Irrigation
8. Sowani Lift Scheme(C)

KARNATAKA

9. Upper Krishna
10. Kabini (NP)
11. Harangi (NP)

MADHYA PRADESH

12. Mahanadi Res. Ph.I.
13. Sindh Ph-I.
14. Pairi
15. Jonk
16. Rangwan
17. Kolar

MAHARASHTRA

18. Panch Irrigation
19. Upper Tap St. IV
20. Warna

MANIPUR

21. Loktak Lift Irrigation

ORISSA

22. Anandpur Barrage (C)
23. Hengali Dam

PUNJAB

24. Diversion Weir of Shahnahar Canal (C)

RAJASTHAN

25. Mahi Bajaj Sagar

UTTAR PRADESH

26. Dohrighat Sahayak (C)
27. East Baigul (C)
28. Tehri Dam
29. Adwa Dam (C)

GOA DAMAN & DIU

30. Salauli

1	2
V Plan Schemes (73 Nos.)	
	ANDHRA PRADESH
1.	Somasila St. I & II
2.	Improvement to Nizamsagar (C)
3.	Singur
4.	Samalkota Summer Storage Res.(C)
	ASSAM
5.	Dhansiri
	BIHAR
6.	Durgawati
7.	Barnar Res.
8.	Upper Kiul
9.	Bateshwarathan
10.	Konar Diversion
11.	Tilaya Diversion
12.	North Koel
13.	Bansagar
14.	Subaranarekha
15.	Ajoy Barrage
	GUJARAT
16.	Karjan
17.	Sukhi
	HARYANA
18.	J.L.N. Lift Irrigation
19.	Sutlej Yamuna Link
20.	New Tajewala Barrage
21.	Augmentation Canal (C)
	JAMMU & KASHMIR
22.	Ravi Tawi Irrigation Complex
	KARNATAKA
23.	Chataprabha St.III
24.	Karanja
25.	Bennithore
26.	Hippargi Barrage
	KERALA
27.	Muvattapuzha
28.	Chimoni
	MADHYA PRADESH
29.	Barnarpur LBC
30.	Bargi
31.	Kodar
32.	M.R.P.II
33.	Sukta
34.	Upper Wainganga
	MAHARASHTRA
35.	Upper Penganga
36.	Upper Wardha
37.	Manjra
38.	Dudhganga
39.	Waghar
40.	Upper Pravara

1	2
41.	Kaliasarar
42.	Chaskaman
43.	Nandur Madheshwar
44.	Lower Dudhana
45.	Jayakwadi St.I & II(WB)
	MANIPUR
46.	Singda Dam
	ORISSA
47.	Upper Kolab
48.	Mahanadi-Birupa Barrage
	PUNJAB
49.	Thein Dam
	RAJASTHAN
50.	Rajasthan Canal St.II
	TAMIL NADU
51.	Modernisation of Periyar Vaigai System (C)
	UTTAR PRADESH
52.	Strengthening of Sarda Sagar (C)
53.	Remodelling Bhimgoda
54.	I/C of Narainpur Pump Canal
55.	Jamrani Dam
56.	Lakkwar Vyasi
57.	Madhya Ganga Canal
58.	Parallel Lower Ganga Canal (C)
59.	Shahzad
60.	Sone Pump Canal
61.	Maudha Dam
62.	Kanhar Irrigation
63.	Rajghat
64.	New Okhla Barrage
65.	Urmil
66.	Raising of Meja Dam
67.	Sarju Nahar Pariyojana (LB Chargra Canal)
68.	Suheli (C)
69.	I/C of Kamania Pump Canal
70.	Eastern Ganga Canal
71.	Beewar Feeder
72.	Medho Tanda Irrigation (C)
	WEST BENGAL
73.	Teesta Barrage.

1	2
Annual Plan (1978-80) Projects	
	GUJARAT
1.	Heran
2.	Sipu
3.	Watrak
	HARYANA
4.	Storage of Kotta, etc. & Masani Barrage
	KARNATAKA
5.	KRS RBC (Varuna) (N.P.)
	MADHYA PRADESH
6.	Hasdeo Bango
7.	Halali (C)
8.	Thanwar

1	2
	MAHARASHTRA
9.	Surya
10.	Bawanthadi
11.	Isthapuri
12.	Tillari
	MANIPUR
13.	Thoubal
	ORISSA
14.	Upper Indravati
	TAMIL NADU
15.	Improvement to Modernisation of Cauvery Delta.

(C) - Likely to be completed in VI Plan and not included in VII Plan proposals.

N.P.- Non Plan Project.

Annexure-IV

NEW MAJOR PROJECTS OF THE SIXTH PLAN

Sl. No.	Name of Project/ State
1	2
	ANDHRA PRADESH
1.	Srisailam Right Bank Canal*
2.	Polavaram Barrage*
3.	Jurala Project
4.	Madras Water Supply Scheme - Kandaleru Res.
5.	Yeluru Res.*
6.	Warabandi in existing irrigation system
	ASSAM
7.	Champamati*
8.	Puthimari*
	BIHAR
9.	Auranga Res.
10.	Masan Dam
11.	Ajgaibinath Pump
12.	Jamania Pump
13.	Amanat Res.
14.	Tahle Res.
15.	Kanhar Res.
16.	Lilajan Res.
17.	Upper Sakri Res.
18.	Mahananda Barrage at Bagdob
19.	Mohane Res.
20.	Barari Pump
21.	Mahananda Barrage at Taiyabpur
22.	Sonua Res.
23.	Punasi Res.
24.	Burhai Res.
25.	Bansloi Res.
26.	Dhakwa Res.
27.	Sarkunda Res.
28.	Kanchi Res.
29.	Sukasanaghat Pump
30.	Damanpur Res.
31.	Jaiajore Res.
32.	Koel Karo
	GUJARAT
33.	Narmada Project Narmada Planning Unit (W.B.)*
34.	Znakhari (W.B.)*
35.	Sidhumber*
	HARYANA
36.	Making Parallel WJC, increasing its capacity from Tajewela to Munah.*
37.	Conservation measures by installing 750 Ms sprinkler irrgn. sets.*
38.	Installing 25 Nos. Drip Irrigation sets.*

1	2
39.	Providing Irrigation to Mewat areas and Pataudi areas*
40.	Interlinking old augmentation tubewells to augmentation canal*
41.	Remodelling EMB and its distribution system
42.	Scheme for use of flood water
	HIMACHAL PRADESH
	-Nil-
	JAMMU & KASHMIR
	-Nil-
	KARNATAKA
43.	Varahi*
44.	Dudhganga
45.	Upper Bhadra
46.	Ramthal Lift
	KERALA
47.	Idamalayar*
48.	Beyprepuzha*
49.	Kuriarkutty Karapara*
50.	Kakkadavu*
	MADHYA PRADESH
51.	Mahanadi Res. Ph.III
52.	Arpa*
53.	Bargi Diversion
54.	Dhobatoria
55.	Man
56.	Johat
57.	Chota Tawa

1	2
58.	Upper Narmada
59.	Kutpali*
60.	Marwahi*
61.	Bamraha*
62.	Sindh Ph. II
63.	Narmada Sagar Unit I
64.	Bawanthadi
65.	Upper Tapi
66.	Mahi
67.	Pancham Nagar
68.	Chambal L.I.S. Kanera
	MAHARASHTRA
69.	Poshir
70.	Lendi
71.	Lower Penganga
72.	Lower Thirna
73.	Ghosi Khurd
74.	Lower Wardha *
75.	Lower Warna
76.	Wan
77.	Arunavati
78.	Tultuli
79.	Sangola Branch
80.	Karwa
81.	Talomba
82.	Punad

1	2
83.	Gated Wier at Khodashi
	MANIPUR
	-Nil-
	MEGHALAYA
	-Nil-
	ORISSA
84.	Subarnarekha
85.	Samakoi
86.	Addl. Spillway of Hirakud Dam
87.	Ong Stg.II (Chiroli)
88.	Indra
89.	Kanupur
	PUNJAB
90.	Low Dam in Kandi area*
91.	Shahpur Kandi
92.	Providing Irrigation facilities to area left side of Narwana Branch*
	RAJASTHAN
93.	New works of Chambal
94.	Narbada*
95.	Mt. Abu Hydel Irrigation Project*
96.	Bisalpur Irrigation-cum-water supply Project*
97.	Thein Dam*
98.	Nohar Feeder*

1	2
99.	Sidhmukh
	TAMIL NADU
100.	Parambikulam Extension *
	UTTAR PRADESH
101.	Kishau Dam*
102.	Kothi Behl Dam*
103.	Arjun Sahayak*
104.	Increasing Capacity of Bhopali Pump Canal
105.	Increasing capacity of Chillimali Pump Canal
106.	Lining of Lower Ganga Canal
	TRIPURA
	-Nil-
	WEST BENGAL
107.	Darkeshwar Reservoir
108.	Sidheswari Reservoir
109.	Teesta Barrage Project 2nd Subetg. of Stg.I Phase I.
110.	Ajoy Reservoir
111.	Barrage on Subarnarekha at Bhosraghat
112.	Upper Kangsabati
113.	Lift Irrigation Scheme for Gazel area
114.	Tangon Valley
115.	Bamangola Hebhpur lift Irrigation.

* Projects for which specific outlays are provided in VI Plan.

Annexure-V

MAJOR/MEDIUM PROJECTS AIDED BY EXTERNAL AGENCIES

Sl. No.	Name of Project/ State
1	2
1.	A.P. Irrigation (Nagarjunasagar) (Andhra Pradesh)
2.	Gujarat Medium (Cr.808-IN) (Gujarat)
3.	Gujarat Irrg.II(Cr.1011-IN) (Gujarat)
4.	Haryana Irrg.I(Cr.843-IN) (Haryana)
5.	Haryana Irrg.II(Cr.1319-IN) (Haryana)
6.	Karnataka Irrg. (UKP) (Cr.788-IN) (Karnataka)
7.	Kerala Kallada (Cr.1269-IN) (Ln.2186-IN) (Kerala)
8.	M.P. Medium (Cr.1108-IN) (Madhya Pradesh)
9.	M.P. Major (Cr.1177-IN) (Madhya Pradesh)
10.	Mah. Irrg.(Jayakawadi) (Mah.) (Cr.736-IN)
11.	Mah.Irrg.II (Cr.954-IN) (Maharashtra)
12.	Bhima Irrg.(Loan-23-IN) (Maharashtra)
13.	Orissa Irrg. (Cr.740-IN) (Orissa)
14.	Orissa Irrg.II (Orissa)
15.	Subarnarekha Irrg. (Cr. 1289-IN) (Orissa & Bihar)
16.	Mahanadi Barrage (Cr.889-IN) Orissa)
17.	Punjab Irrg.(Cr.889-IN) (Punjab)
18.	Tamil Nadu Irrg. (Periyar Vaigai) (Cr.720-IN) (Tamil Nadu).

LIST OF PROJECTS IN PIPELINE FOR WORLD BANK ASSISTANCE

FY 1984

1. Rajasthan Chambal CAD Project (Rajasthan)
2. Sardar Sarovar (Gujarat)
3. Upper Ganga Modernisation (Uttar Pradesh)
4. Hathni Kund Barrage (U.P.) Interstate with (Haryana)
5. West Bengal Tubewells (West Bengal)
6. Kangsabati (Composite)
7. Periyar Vaigai II (Tamil Nadu)
8. Jayakwadi (Maharashtra)
9. Sone Modernisation
10. Hathnikund Barrage Project (Haryana Interstate with Uttar Pradesh)
11. Sriramsagar & Pochampad II (Andhra Pradesh)

FY 1985

1. Rajasthan (Repeater)
2. Subernarekha (West Bengal)
3. Cauvery Delta Modernisation (Tamil Nadu)
4. Maharashtra II (Repeater)
5. Bihar Medium
6. Bihar Composite
7. Sutlej Yamuna Link (Punjab Interstate with Haryana)
8. Punjab Modernisation II
9. Rengali (Orissa)
10. Upper Indravati (Orissa)
11. Upper Krishna (repeater) (Karnataka)
12. Narmada Sagar Complex
13. Kerala (Composite)
14. Srisailam Right Bank (Andhra-Pradesh)
15. Krishna Modernisation
16. Sutlej Yamuna Link (Haryana, Interstate with Punjab).

FY 1986

1. Rajasthan Composite
2. Gujarat Medium (Repeater)
3. U.P. Tubewells III
4. West Bengal Composite
5. Maharashtra III (MCIP-III)
6. Subarnarekha Repeater (Bihar)
7. Bihar Tubewells
8. Haryana Modernisation - II
9. Godavari Modernisation (Andhra Pradesh)
10. A.P. Medium Irrigation
11. Jurala Irrigation (Andhra Pradesh)
12. Thein Dam Project (Punjab)
13. Subarnarekha Repeater (Orissa)
14. Mahanadi Delta (Orissa)
15. Orissa Medium III
16. Karnataka Composite and Ghattaprabha Project.

Annexure-VII

IRRIGATION DEVELOPMENT IN STATES THROUGH MAJOR AND MEDIUM PROJECTS

(th. ha.)

Sl. No.	Name of State	Ult. Pot. as assessed	Likely Pot. to end of VI Plan	Percentage of Pot. created at the end of VI Plan
1.	Andhra Pradesh	5000	3391	67.8
2.	Assam	970	135	13.9
3.	Bihar	6500	2879	44.3
4.	Gujarat	3000	1339	44.6
5.	Haryana	3000	1928	64.3
6.	Himachal Pradesh	50	6	12.0
7.	Jammu & Kashmir	250	138	55.2
8.	Karnataka	2500	1285	51.4
9.	Kerala	1000	578	57.8
10.	Madhya Pradesh	6000	1807	30.1
11.	Maharashtra	4100	1785	43.5
12.	Manipur	135	43	31.8
13.	Meghalaya	20	-	-
14.	Nagaland	10	-	-
15.	Orissa	3600	1572	43.7
16.	Punjab	3000	2467	82.2
17.	Rajasthan	2750	1865	67.8
18.	Sikkim	20	-	-
19.	Tamil Nadu	1500	1252	83.5
20.	Tripura	100	-	-
21.	Uttar Pradesh	12500	6828	54.6
22.	West Bengal	2310	1587	68.7
	Total States	58315	30885	52.96
	Union Territories	160	19	11.9
	Total All India	58475	30904	52.8

Source Planning Commission's No. 24 (1)/84 - I & CAD dated 20-6-84.

Annexure-VIII

PERSPECTIVE FOR FUTURE DEVELOPMENT OF IRRIGATION POTENTIAL

Sl. No.	Name of State	Balance Pot. in 1985	Pot. created in V Plan	Pot. likely in VI Plan	Completion year at present rate	Additional Pot. During VII Plan	VIII Plan @	IX Plan @	X Plan @
1	2	3	4	5	6	7	8	9	10
1.	Andhra Pradesh	1610	213	520	2003	500	650	372	88
2.	Assam	835	28	41	2078	181	220	250	184
3.	Bihar	3621	437	427	2027	587	920	1000	1114
4.	Gujarat	1661	302	309	1998	340	500	550	271
5.	Haryana	1072	181	159	2019	420	520	132	-
6.	Himachal Pradesh	44	-	6	2022	6	10	15	13
7.	Jammu & Kashmir	45	16	99	1989	15	20	10	-
8.	Karnataka	1215	161	211	2012	260	400	425	130
9.	Kerala	422	53	120	2005	105	140	150	27
10.	Madhya Pradesh	4193	269	367	2042	1070	1260	1260	623
11.	Maharashtra	2328	286	538	2007	680	875	653	120
12.	Manipur	92	-	35	1997	70	14	8	-
13.	Meghalaya	20	-	-	-	-	5	7	8
14.	Nagaland	10	-	-	-	-	3	3	4
15.	Orissa	2028	187	145	2055	275	500	600	653
16.	Punjab	533	109	158	2002	265	222	-	-
17.	Rajasthan	855	159	330	1998	670	99	-	-
18.	Sikkim	20	-	-	-	-	5	7	8
19.	Tamil Nadu	248	50	73	2002	45	80	100	23
20.	Tripura	100	-	-	-	15	30	35	20
21.	Uttar Pradesh	5672	1368	799	2020	600	1200	2000	1872
22.	West Bengal	722	195	120	2015	345	314	63	-
	Total States:	27376	4064	4457	-	6449	7987	7640	5284
	Union Territories	141	-	-	2021	16	40	45	36
	Total All India:	27517	4064	4457 Say 4.46 M.ha	-	6465 Say 6.5 M.ha.	8027	7685	5320

- Potential during VII Plan as included in draft Working Group Report - based on discussion with States.

@ The Statewise Projections are tentative to cover the assissed ultimate potential of 113 M. ha. for the counry as whole.

Annexure-IX

PER CAPITA EXPENDITURE DURING FIVE YEAR PLANS

Sl No.	State/Union Territories	I Plan 51-56	II Plan 56-61	III Plan 61-66	IV Plan 69-74	V Plan 74-79	VI Plan 80-85
1.	Andhra Pradesh	33	52	91	98	307	713
2.	Assam	29	57	103	136	324	762
3.	Bihar	25	40	67	85	230	572
4.	Gujarat	58	76	108	204	444	1378
5.	Haryana	*	*	*	358	599	1193
6.	Himachal Pradesh	21	64	127	328	691	1618
7.	Jammu & Kashmir	39	77	166	351	785	1948
8.	Karnataka	46	62	100	128	341	773
9.	Kerala	31	49	101	156	267	726
10.	Madhya Pradesh	34	48	84	114	331	912
11.	Maharashtra	37	57	103	199	-	1225
12.	Manipur	17	86	100	290	865	2243
13.	Meghalaya	*	*	*	358	885	2327
14.	Nagaland	*	*	230	747	1621	4038
15.	Orissa	56	54	120	114	267	684
16.	Punjab	175	146	212	316	748	1444
17.	Rajasthan	39	53	97	120	-	786
18.	Sikkim	N.A.	N.A.	N.A.	N.A.	1906	5809
19.	Tamil Nadu	28	57	98	134	272	764
20.	Tripura	21	94	156	227	448	1570
21.	Uttar Pradesh	25	32	72	132	277	662
22.	West Bengal	54	48	80	82	281	790
	Average per State	38	51	92	142	338	872

* The States were formed subsequently.

Annexure-X

INTERSTATE PROTECTS OF VI PLAN

(Rs. Crores/th. ha.)

Sl. No.	Name of Scheme	Sl. No.	Name of Scheme
1	2	1	2
1.	Tungabhadra HLC St. II Andhra Pradesh Karnataka	11.	Gandak Bihar Uttar Pradesh
2.	Bansagar Bihar Madhya Pradesh Uttar Pradesh	12.	New Tajewala Barrage Haryana Uttar Pradesh
3.	Mahi Bajajsagar Gujarat Rajasthan	13.	Tillari Maharashtra Goa, Daman & Diu
4.	Beas Unit I & extn. Punjab Haryana Rajasthan	14.	Sardar Sarovar Gujarat Madhya Pradesh Maharashtra Rajasthan
5.	Beas Unit II & Extn. Punjab Haryana Rajasthan	15.	Subarnarekha Bihar Orissa West Bengal
6.	New Okhla Barrage Haryana Rajasthan Uttar Pradesh	16.	Telugu Ganga Project Andhra Pradesh Tamil Nadu (Subsequent proposal)
7.	Rajghat Madhya Pradesh Uttar Pradesh		
8.	Urmil Madhya Pradesh Uttar Pradesh		
9.	Gurgaon Canal Haryana Rajasthan		
10.	Chambal Rajasthan Madhya Pradesh		

Annexure-XI

MAJOR ON-GOING PROJECTS OF THE SIXTH PLAN STARTED BEFORE 1-4-1976 WHICH ARE LIKELY TO BE COMPLETED DURING THE SIXTH PLAN

Sl. No.	Name of the State/Project.
1	2
	ANDHRA PRADESH
1.	Nagarjunasagar
2.	Sriram Sagar St.I
3.	Godavari Barrage
4.	Vamsadhara Stage - I
5.	Tungabhadra H.L.C. St. II
6.	Samasila Stage - I
	ASSAM
7.	Dhansiri
	BIHAR
8.	Gandak
9.	Kosi Barrage & Eastern Canal
10.	Rajpur Canal
11.	Sone H.L.C.
12.	Barner Reservoir
	GUJARAT
13.	Mahi Stage - I
14.	Mahi Stage-II (Kadana)
15.	Damanganga
16.	Panam
17.	Ukai
18.	Sabarmati
	HARYANA
19.	Beas Unit - I
20.	Beas Unit-II
21.	Gurgaon Canal
22.	Jawahar Lal Nehru Lift Scheme
23.	Loharu Lift Irrigation
24.	Sewani Lift Irrigation
25.	W.J.C. Remodelling
	KARNATAKA
26.	Bhadra
27.	Tungabhadra
	Tungabhadra H.L.C.
	KERALA
28.	Chittarpuzha
29.	Kuttiadi
30.	Pamba
31.	Pazhassi
	MADHYA PRADESH
32.	Mahanadi Reservoir Ph-I
33.	Tawa
34.	Upper Wainganga
35.	Chambal (St.-I. & St-II)
	MAHARASHTRA
36.	Jayakwadi St.-I
37.	Krishna
38.	Bhima
39.	Upper Tapi St.-I
40.	Manjra
41.	Mula
42.	Waghur

1	2
43.	Khadakwasla
44.	Upper Godavari
	MANIPUR
45.	Loktak Lift Irrigation
	ORISSA
46.	Mahanadi Delta
47.	Anandpur Barrage
48.	Rengali Dam (Dam's Share under Irrigation)
	PUNJAB
	Beas Unit - I
	Beas Unit - II
49.	Diversion weir of Shahnahar Canal
	RAJASTHAN
	Beas Unit - I
	Beas Unit - II
	Chambal (St-I & II)
	Gurgaon Canal
50.	Jakham
51.	Mahi Bajaj Sagar
52.	Rajasthan Canal St-I
	TAMIL NADU
53.	Parambikulam Aliyar
54.	Modernisation of Periyar Vaigai system
	UTTAR PRADESH
	Gandak Canal
55.	Sarda Sahayak
56.	Kosi Irrigation
57.	East Baigul Reservoir
58.	Increasing Capacity of Narainpur Pump Canal
59.	Parallel Lower Ganga Canal
60.	Sone Pumped Canal
61.	Increasing Capacity of Deokali Pump Canal
	WEST BENGAL
62.	Kangsabati Reservoir
63.	Teesta Barrage Ist Substage of Phase - I
64.	D.V.C. Extn. & improvements
	GOA DAMAN & DIU
65.	Salauli
	Damanganga
	DADRA & NAGAR HAVELI
	Damanganga

Annexure-XII

ADDITIONAL LIST OF MAJOR PROJECTS TAKEN UP BEFORE 1-4-76 WHICH ARE ONGOING IN THE SIXTH PLAN BUT NOT MENTIONED IN THE DRAFT VI PLAN DOCUMENT SPECIFICALLY

Sl. No.	Name of Project
	GUJARAT
1.	Kakrapar
	MAHARASHTRA
2.	Bagh
3.	Kal
4.	Itiadoh
5.	Upper Godavari
6.	Tulshi
	MADHYA PRADESH
7.	Barna
8.	Hasdeo RBC
9.	Bhander Canal
	ORISSA
10.	Salandi
	PUNJAB
11.	Extn. of Non-Perennial Irrigation to UBDC tract.
12.	Utilisation of surplus Ravi Beas Waters
	TAMIL NADU
13.	Chittarpattanamkal
	UTTAR PRADESH
14.	Ramganga
	WEST BENGAL
15.	Mayurakshi.

Annexure-XIII

MAJOR ON-GOING PROJECTS OF SIXTH PLAN STARTED BEFORE 1-4-1976 WHICH ARE LIKELY TO SPILL-OVER INTO SEVENTH PLAN

Sl. No.	Name of Projects
	BIHAR
1.	Bagmati
2.	Western Kosi Canal
3.	Durgawati
	JAMMU & KASHMIR
4.	Ravi
	KARNATAKA
5.	Upper Krishna
6.	Malaprabha
	KERALA
7.	Kallada
8.	Periyar Valley
9.	Kanhirpuzha
	MAHARASHTRA
10.	Warna
11.	Kukadi St-I
12.	Surya
	RAJASTHAN
13.	Rajasthan Canal St-II
	UTTAR PRADESH
14.	Tehri Dam
15.	Jamrani Dam
16.	Lakhwar Vyasi
17.	Madhya Ganga Canal St-I

Annexure-XIV

LIST OF MAJOR PROJECTS TAKEN UP DURING V PLAN & ANNUAL PLAN 78-80 WHICH ARE IN AN ADVANCED STAGE OF CONSTRUCTION

Sl. No.	Name of the State/Projects	Sl. No.	Name of the State/Projects
1	2	1	2
	ANDHRA PRADESH		MADHYA PRADESH
1.	Somasila I, II	17.	Bargi
2.	Singur	18.	Kolar
3.	Improvement to Nizamsagar	19.	Sukta
	BIHAR	20.	Upper Wain Ganga
4.	Subarnarekha	21.	Hasdeo Bango Rajghat
5.	Upper Kiul Reservoir	22.	Bansagar Urmil
6.	Kanar Diversion		MAHARASHTRA
	GUJARAT	23.	Upper Penganga
7.	Karjan	24.	Upper Wardha
8.	Sukhi	25.	Manjra
9.	Sipu	26.	Dudh Ganga
10.	Vatrak	27.	Kolisarai
	HARYANA	28.	Jayakwadi I, II (W.B. aided)
11	J.L.N. Lift Irrigation	29.	Surya
12.	Part share cost of storage on Kota Bhindwas and others	30.	Bawandhadi
			ORISSA
13.	SYL Canal	31.	Upper Indravati
	KARNATAKA	32.	Upper Kolab
14.	Chataprabha Stage III	33.	Mahanadi Birupa
15.	Karanja		PUNJAB
	KERALA	34.	Thein Dam
16.	Chimoni	35.	Utilisation of surplus Ravi Beas waters

1	2
	RAJASTHAN
36.	Rajasthan Canal Project II
	UTTAR PRADESH
37.	Raising Meja Dam
38.	Rajghat
39.	Madhya Ganga
40.	Mandha
41.	Sarju Nahar Pariyojana
42.	Urmil
43.	Eastern Ganga Canal
44.	Bewar Feeder
45.	Shahzad Dam
46.	Bhim Khoda H.W.
	WEST BENGAL
47.	Teesta Barrage Project

STATES PROPOSALS FOR VII PLAN

(Based on outlays and potentials suggested by the States in their proposals and subsequent discussions)

ABSTRACT I (FINANCIAL OUTLAYS)

Outlays in crores of Rs.

Sl. No.	Name of State	Ongoing pre-V Plan	major V Plan	Schemes VI Plan	Ongoing medium schemes	New Schemes proposed under VII Plan		Modernisation schemes	Field channels water courses	Water Development	Total
						Major	Med.				
1	2	3	4	5	6	7	8	9	10	11	12
1.	Andhra Pradesh	410	117	990	191	270	20	60	55	45	2158
2.	Assam	-	50	20	49	-	161	11	3	7	301
3.	Bihar	377	1156	190	198	50	138	338	12	70	2529
4.	Gujarat	33	126	1362	296	-	150	150	65	95	2277
5.	Haryana	10	203	63	2	184	-	133	27	1	623
6.	Himachal Pradesh	-	-	-	10	5	14	-	-	1	30
7.	Jammu & Kashmir	-	-	-	72	-	16	3	-	5	96
8.	Karnataka	400	250	100	65	-	20	25	25	35	920
9.	Kerala	107	54	105	127	-	-	25	30	25	473
10.	Madhya Pradesh	415	928	1102	245	70	100	50	25	109	3044
11.	Maharashtra	841	669	477	396	135	50	1	50	90	2709
12.	Manipur	2	70	-	1	70	-	-	-	4	147
13.	Orissa	-	559	182	327	25	25	47	15	35	1215
14.	Punjab	1	104	15	42	263	-	8	-	9	542
15.	Rajasthan	62	240	229	103	289	50	120	15	15	1123
16.	Tamil Nadu	-	-	14	59	62	47	135	10	30	357
17.	Tripura	-	-	-	32	-	-	-	-	3	35
18.	Uttar Pradesh	522	1058	100	24	160	22	166	96	82	2230
19.	West Bengal	23	250	173	17	2	18	86	5	26	600
20.	Union Territories	61	50	-	17	-	-	-	-	-	128
	Total	3264	5884	5122	2273	1685	831	1358	433	687	21537

ANNEXURE XV-(Contd.)

ABSTRACT II (PHYSICAL TARGETS)

S. No.	Name of State	Ongoing pre V Plan	Major Schemes V Plan	VI Plan	Ongoing medium Schemes	New Schemes proposed under VII Plan Major	Medium	Moderni-sation Schemes	Total
1.	Andhra Pradesh	227	56	190	110	-	-	30	613
2.	Assam	-	83	30	110	-	-	-	213
3.	Bihar	292	405	45	118	-	46	5	911
4.	Gujarat	26	147	53	152	-	60	22	460
5.	Haryana	21	105	136	8	-	-	150	420
6.	Himachal Pradesh	-	-	-	7	-	-	-	7
7.	Jammu & Kashmir	-	-	-	15	-	-	-	15
8.	Karnataka	202	50	10	48	-	-	-	310
9.	Kerala	91	30	--	-	-	-	-	121
10.	Madhya Pradesh	144	601	243	229	-	16	82	1315
11.	Maharashtra	265	186	89	222	-	-	-	762
12.	Manipur	10	38	-	3	27	-	-	78
13.	Orissa	-	180	10	120	-	-	-	310
14.	Punjab	5	54	8	43	201	-	-	311
15.	Rajasthan	27	524	130	90	15	-	-	786
16.	Tamil Nadu	-	-	9	24	12	5	5	55
17.	Tripura	-	-	-	20	-	-	-	20
18.	Uttar Pradesh	77	506	-	85	70	-	43	861
19.	West Bengal	82	210	58	35	22	24	20	451
20.	Union Territories	18	1	-	7	-	-	-	26
	Total	1487	3256	1011	1436	347	151	357	8045

A. ONGOING MAJOR SCHEMES OF VII PLAN

Sl. No.	Name of Projects	Latest esti. cost.	FINANCIAL		Ult. Pot.	PHYSICAL		Re-marks.
			Resi-dual cost for completion	Out lay in VII Plan		Spill-over Pot.	Pot. tar get-ted for VII Plan.	
(I) PRE FIFTH PLAN PERIOD								
ANDHRA PRADESH								
1.	Nagarjunasagar	846	286	150	895	90	90	
2.	Sriramsagar St.I	592	195	195	411	128	128	
3.	Tungabhadra HLC St.II(IS)	98	50	50	49		-	
4.	Vamasadhra St.I	47	15	15	20	11	9	
	Total	1583	546	410	1375	229	227	
BIHAR								
4.	Bagmati	222	205	175	102	102	45	
5.	Western Kosi Canal	282	202	202	289	286	247	
	Total	504	407	377	391	382	292	
GUJARAT								
6.	Ukai	23	1	1	127	-	-	
7.	Sabarmat	78	1	1	57	-	-	
8.	Panam	55	6	6	49	-	-	
9.	Damanganga	130	18	18	57	26	26	
	Mahi Bajaj Sagar (IS)	48	7	7	-	-	-	
	Total	334	33	33	290	26	26	
HARYANA								
	Beas Unit I & its Extn.(IS)	9	0.2	0.2	-	-	-	No direct benefi
	Beas Unit II & its Extn.(IS)	42	3	3	-	-	-	-do-

Based on outlays & potentials suggested by the State in their proposals & subsequent discussions.

1	2	3	4	5	6	7	8	9
Haryana(Contd.)								
10.	Loharu lift Irgn.	35	3	3	66	-	-	No direct bene-fit
11.	W,J.C.Remodelling	13	2	2	248	-	-	-do-
12.	Gurgaon Canal	17	2	2	81	60	21	-do-
	Total	116	10.2	10.2	395	60	21	
KARNATAKA								
13.	Malaprabha	254	94	94	213	33	83	
14.	Tungabhadra HLC	17	6	6	81	13	13	
15.	Upper Krishna	1259	931	300	425	262	106	
	Total	1530	1031	400	719	353	202	
KERALA								
16.	Periyar Valley	49	4	4	86	8	8	
17.	Pamba	51	2	2	48	3	3	
18.	Kallada	218	77	77	92	59	55	
19.	Kuttiadi	50	3	3	37	3	3	
20.	Chitturpuzha	10	5	5	27	9	9	
21.	Kanhirapuzha	44	8	8	22	3	3	
22.	Pazhassi	57	8	8	32	10	10	
	Total	488	107	107	344	95	91	
MADHYA PRADESH								
23.	Mahanadi Res.	633	508	350	340	122	70	
24.	Sindh Ph.I	24	3	3	37	-	-	
25.	Pairi	20	6	6	73	21	21	
26.	Jonk	16	6	6	14	8	8	
27.	Rangwan HLC	7	1	1	17	-	-	
28.	Kolar	79	49	49	45	45	45	
	Total	779	573	415	526	196	144	
MAHARASHTRA								
29.	Khadakwalla	196	121	121	62	24	19	
30.	Jayakwadi St.I & II(NWB)	402	213	215	136	78	78	
31.	Krishna	142	33	33	116	43	43	

1	2	3	4	5	6	7	8	9
32.	Bhima	313	127	119	162	78	60	
33.	Kukadi	290	150	150	156	113	-	
34.	Upper Godavari	75	31	5	56	-	-	
35.	Ponch	105	21	21	94	5	5	
36.	Upper Tapi St.I &II	91	27	27	87	57	25	
37.	Warna	381	284	150	114	107	35	
	Total	1995	1009	841	973	505	265	
MANIPUR								
38.	Loktak lift Irgn. scheme	23	2	2	40	10	10	
ORISSA		NIL						
PUNJAB								
39.	Extn,of non-perrenial irgn. in U.B.D.C.tract.	8	1	1	235	5	5	
RAJASTHAN								
-	Beas Unit I & its extn.(IS)	1	0.05	0.05	-	-	-	No direct bene-fit
-	Beas Unit II & its extn.(IS)	149	13	13	-	-	-	-do-
-	Chambal left over works R.P.S.& Jawahar Dam	19	1	1	-	-	-	-do-
40.	Mahi Bajaj Sagar	188	26	26	71	16	16	
41.	Rajasthan Canal St.I	241	14	14	587	-	-	
42.	Jakham	45	8	8	21	11	11	
	Total	543	62	62	679	27	27	
UTTAR PRADESH								
43.	Tehri Dam	560	428	275	270	270	-	
44.	Lakhwar Vyasi	185	158	50	50	50	-	
45.	Sone Pumped Canal	32	15	15	31	31	31	
46.	Sarda Sahayak	610	182	182	1582	46	46	
	Total	1387	783	522	1933	397	77	

1	2	3	4	5	6	7	8	9
WEST BENGAL								
47.	Kangsabati	100	11	11	402	22	22	
48.	Barrage & Irrgn.system of DVC extn. & improving	42	12	12	515	60	60	
	Land acquisition in Maithon & Panchet Dam Reservoir.							
	Total	142	23	23	917	82	82	
UNION TERRITORIES GOA, DAMAN & DIU								
49.	Salauli	35	9	9	14	14	14	
-	Damanganga	7	2	2	3	3	3	
	Total(UT)	42	11	11	17	17	17	
	GRAND Total	9539	4648	3264	10054	2412	1487	
(II) FIFTH PLAN SCHEMES								
ANDHRA PRADESH								
1.	Somasila St.I&II	147	85	85	44	42	40	
2.	Improvement to Nizam Sagar St.I	16	1	1	-	-	-	
3.	Singur	57	31	31	16	16	16	
	Total	220	117	117	60	58	56	
ASSAM								
4.	Dhansiri	66	50	50	83	83	83	
BIHAR								
5.	North Koel	230	150	150	131	128	97	
6.	Ajoy Barrage	114	85	85	40	40	40	
7.	Subarnarekha	524	435	405	209	209	109	
8.	Durgawati	126	106	106	36	36	25	
9.	Barner	67	59	59	22	22	20	
10.	Upper Kiul Res.	51	29	29	14	14	14	
11.	Konar Diversion	120	95	95	63	63	50	
12.	Tilaiya Diversion	124	121	121	49	49	30	

1	2	3	4	5	6	7	8	9
13.	Bateshwarasthan Ph.I	58	52	52	25	25	20	
	Bansagar Dam (State's share)	75	54	54	-	-	-	
	Total	1489	1186	1156	589	586	405	
GUJARAT								
14.	Karjan	129	36	36	78	59	59	
15.	Sukhi	63	7	7	25	10	10	
16.	Heran	51	44	44	40	40	40	
17.	Sipu	59	32	32	32	32	32	
18.	Watrak	34	7	7	18	6	6	
	Total	336	126	126	193	147	147	
HARYANA								
19.	JLN Lift Irrigation	129	10	10	155	82	50	
	New Okhla Barrage (I.S)	10	8	8	-	-	-	
20.	Part share cost of storage on Kotla Bhindwas other lake & Massani Barrage	11	5	5	10	10	5	
21.	Tajewala Barrage (I.S)	57	40	40	-	-	-	
22.	S.Y.L. Canal	260	164	140	275	275	50	
	Total	467	227	203	440	367	105	
KARNATAKA								
23.	Ghataprabha St.III	177	122	122	178	158	35	
24.	Karanja	55	29	29	36	34	5	
25.	Bennithora	29	22	22	20	20	5	
26.	Hippargi Barrage	81	77	77	51	50	5	
	Total	342	250	250	285	262	50	
KERALA								
27.	Muvuttapuzha	57	37	37	52	52	20	
28.	Chimoni	27	17	17	26	26	10	
	Total	84	54	54	78	78	30	

1	2	3	4	5	6	7	8	9
MADHYA PRADESH								
29.	Bariarpur LBC	28	16	16	44	44	44	
30.	Bargi Unit I& Unit II	438	306	188	248	245	120	
31.	Kodar	19	6	6	23	4	4	
32.	Sukta	14	1	1	19	-	-	
33.	Upper Wainganga	33	12	12	105	103	103	
34.	Hasdeo Bango	608	472	360	255	255	125	
	Rajghat Unit I & II(I.S)	240	137	62	97	97	97	
35.	Bansagar Unit I & II(I.S)	587	489	280	248	248	100	
	Urmil	10	3	3	8	8	8	
	Total	1977	1442	928	1047	1004	601	
MAHARASHTRA								
36.	Upper Penganga	324	212	150	112	95	50	
37.	Upper Wardha	210	147	147	82	82	80	
38.	Manjra	34	2	2	24	-	-	
39.	Dudhganga	166	129	50	65	65	10	
40.	Waghur	29	26	25	24	24	5	
41.	Upper Pravara	90	85	25	74	74	-	
42.	Kalisarar	7	1	1	4	-	-	
43.	Chaskaman	53	46	40	39	39	-	
44.	Nandur Madhmeshwar	92	88	25	45	45	5	
45.	Lower Dudhna	36	36	10	30	30	-	
46.	Jayakwadi St.I & II (WB)	155	29	29	142	-	-	
47.	Surya	76	38	38	27	17	13	
48.	Bawanthadi	52	39	25	25	25	-	
49.	Isthapuri	88	75	75	40	40	15	
50.	Tillari	32	27	27	8	8	8	
	Total	1444	980	669	741	544	186	
MANIPUR								
51.	Singda	9	8	4	4	4	4	
52.	Thoubal	66	66	66	34	34	34	
	Total	75	74	70	38	38	38	

1	2	3	4	5	6	7	8	9
ORISSA								
53.	Upper Indravati Dam, Irrigation	194	161	130	186	186	50	
54.	Upper Kolab Dam Irrigation	125	79	79	94	94	30	
55.	Mahanadi Birupa	110	50	50	-	-	-	
56.	Rengali Irrigation	799	756	300	424	424	100	
	Total	1228	1046	559	704	704	180	
PUNJAB								
57.	Thein Dam	841	748	100	348	348	-	
58.	Utilisation of Surplus Ravi Beas Waters	14	4	4	305	54	54	
	Total	855	752	104	653	402	54	
RAJASTHAN								
59.	R.C.P.St.II	465	240	240	670	524	524	
	Okhla Barrage	1	-	-	-	-	-	
	Total	466	240	240	670	524	524	
UTTAR PRADESH								
60.	Raising Meja Dam	16	3	3	15	15	15	
61.	Rajghat(i) Dam (U.P.Share)(ii) Canal	110	60	60	142	142	82	
62.	Kanhar Irrigation	110	88	55	32	32	32	
63.	Jamrani Dam	210	200	150	63	42		
64.	Madhya Ganga	222	90	90	178	168	130	
65.	Maudha Dam	35	20	20	28	28	28	
66.	Sarju Nahar Pariyojna	540	392	300	1404	1404	1404	
	Tajewala Barrage (Hathni Kund)	20	20	20	-	-	-	
	Bansagar(i) Dam (ii) Canal	270	238	215	134	134	-	
67.	Urmil Dam	12	5	5	5	5	5	
68.	Eastern Ganga Canal	150	121	85	105	105	50	
69.	Zamania Pump Canal	25	17	17	26	26	16	
70.	Bewar Feeder	38	27	27	18	18	18	

1	2	3	4	5	6	7	8	9
71.	Shahzad Dam	25	8	8	20	20	20	
72.	Bhimgoda Headworks	31	3	3	-	-	-	
	Total	1814	1292	1058	2170	2139	586	
WEST BENGAL								
73.	Teesta Barrage Projects (I Sub-Stage of Stage-I)	400	250	250	380	370	210	
U.T.								
	Tillari	65	50	50	17	17	1	
	Grand Total	11327	8136	5884	8148	7323	3256	

SCHEMES OMITTED FROM PRE FIFTH & V PLAN SCHEMES BY STATES

Pre Fifth Plan Schemes:

1. Kabini — Non Plan Schemes of Karnataka
2. Hemavathy — - do -
3. Harangi — - do -

V Plan Schemes:

4. Mahanadi Reservoir Ph.III (included as one scheme)
5. New Okhla Barrage (Part Project - included in Haryana)
6. Beas Units I & II (Punjab portion completed
7. Haryana & Rajasthan portion ongoing)
8. Modernisation of Cauvery Delta (Transferred to modernisation)
9. Thanwar
10. Varuna (KRSRBC) Non Plan Schemes of Karnataka.
11. I/C of Narainpur P.C.

(III) SIXTH PLAN SCHEMES

ANDHRA PRADESH								
1.	Yeleru Reservoir	171.00	130	130	58	58	-	-
2.	Polavaram Barrage	884	884	10	189	189	-	-
3.	Srisailam R.B.C.	220	205	200	77	77	20	-
4.	Jurela	115.00	100	100	41	41	20	
5.	Teluguganga	637.00	569	450	233	233	150	
6.	Vamsadhara St.II	154	151	100	22	22	-	
	Total	2181	2039	990	620	620	190	
ASSAM								
7.	Champamati	22	20	20	30	30	30	
	Total	22	20	20	30	30	30	

1	2	3	4	5	6	7	8	9
BIHAR								
8.	Masan Dam	65	61	61	22	22	15	
9.	Auranga Res.	165	161	100	75	75	10	
10.	Punasi Res.	32	29	29	24	24	20	
	Total	262	251	190	121	121	45	
GUJARAT								
11.	Zankari	61.00	49	34	24	24	18	
12.	Sidhumber	25.00	26	26	12	11	5	
13.	Sardar Sarovar	3357.00	3041	1302	1750	18	-	
	Total	3443	3116	1362	1786	53	23	
HARYANA								
14.	Remodelling of BMB & its distributory system & constructing new channels for utilising additional supplies through Rajasthan Feeder & Farukkanagar Lift Scheme	22	18	18	36	36	20	
15.	Conservation measures by installing 750 nos. sprinkler Irrigation	18	15	15	400	399	100	
16.	Installing 25 nos. drip irrigation	7.00	7.00	7	20	20	10	
17.	Providing irrigation to Mewat area & Patuadi	61	59	35	23	23	23	
18.	Interlinking old augmentation tubewells	6	6.00	6	6	6	6	
	Total	114	105	63	485	484	136	
KARNATAKA								
19.	Varahi	58	56	26	15	15		
	Dudhganga	9	9	9	13	13		
20.	Upper Bhadra	120	120	50	102	102	10	
21.	Ramthal Lift	15	15	15	17	17		
	Total	202	200	100	147	147	10	

1	2	3	4	5	6	7	8	9
KERALA								
22.	Idamalayar	75	60	40	-	40	-	
23.	Buyporpuzha	14	13	13	-	14	-	
24.	Kuriarkutty Karapara	57	34	20	-	23	-	
25.	Kakkadava	34	32	32	-	26	-	
	Total	180	139	105	-	103	-	
MADHYA PRADESH								
26.	Sindh Ph.II	72	67	67	93	93	50	
27.	Narmada Sagar	593	582	300	123	123	-	
	Bawanthadi	69	65	65	19	19	10	
28.	Arpa	162	159	50	72	72	-	
29.	Man	47	44	44	13	13	13	
30.	Jobat	34	33	33	10	10	10	
31.	Bargi Division	712	712	380	251	251	50	
32.	Mahi	89	83	83	25	25	25	
33.	Ranchamnagar	77	77	55	45	45	45	
34.	Chambal Lift	36.00	25.00	25	40	40	40	
	Total	1891.00	1847.00	1102	691	691	243	
MAHARASHTRA								
35.	Nira Natambi	12	12	10	11	11	-	
36.	Sindkilegaon	23	23	10	13	13	-	
37.	Peshir	13	13	10	11	11	-	
38.	Lendi	35	35	10	20	20	-	
39.	Lower Penganga	207	207	25	136	136	-	
40.	Lower Thirna	47	38	38	20	20	10	
41.	Ghesikhund	372	371	100	190	190	-	
42.	Lower Wardha	51	50	50	53	53	-	
43.	Lower Wunna	54	44	44	21	21	21	
44.	Wan	24	21	21	18	18	18	
45.	Arunawati	24	19	19	31	31	20	
46.	Fultuli	24	22	22	30	30	10	
47.	Karwa	10	8	8	10	10	-	
48.	Gates Weir at Khodashi	3	3	3	11	11	-	
49.	Sangola Br.Canal	22	21	21	10	10	-	

1	2	3	4	5	6	7	8	9
50.	Tatomba	79	75	75	16	16	10	
51.	Punam	12	11	11	17	17	-	
	Total	1017	973	477	618	618	89	
ORISSA								
52.	Subarnarekha	391.49	388	162	138	138	10	
	Addl.Spillway to Hirakud Dam	20	20	20	-	-	-	
	Total	411.49	408.00	182	138	138	10	
PUNJAB								
53.	Dholbaha Dam	9.40	1.00	1	3	3	3	
54.	Low Dam in Kandi	14.00	14.00	14	5	5	5	
	Total	23.40	15.00	15	8	8	8	
RAJASTHAN								
55.	Chambal Lift	18.08	18	18	42	38	38	
56.	Narbada	379.93	380	60	-	-	-	
57.	Mt.Abu Y-III Project	1.51	2	2	-	-	-	
58.	Bisalpur	119.08	119	60	4	-	-	
59.	Nohar	20.67	21	21	26	26	26	
60.	Sidhmukh	63.06	63	63	66	66	66	
	Total	602.33	603	229	138	130	130	
TAMIL NADU								
61.	Pap Ayacut Ext.	18.75	14	14	57	9	9	
	Total	18.75	14	14	57	9	9	
UTTAR PRADESH								
62.	Kotlibhel Dam	593.00	593.00	100	260	260	-	
63.	Arjun Sahayak	50.00	50	-	65	65	-	
64.	Lining of lower ganga canal in Head reaches	40.00	40.00	-	-	-	-	
	Total	683	683	100	325	325	-	
WEST BENGAL								
65.	Darakeshwar Goteshwar	90.00	90	25	45	45	-	
66.	Sideshwar Noohbeel	50.00	50	5	55	55	-	
67.	Ajay	70.00	70	10	20	20	-	

1	2	3	4	5	6	7	8	9
68.	Teesta Barrage-II & Sub-St.I	111.60	111	40	162	162	40	
69.	Subarnarekha(I.S.)	158.55	153	75	130	130	10	
70.	Upper Kangsabati	43.80	44	10	59	59	-	
71.	Gozol Lift	15.00	15.00	2	45	45	5	
72.	Vamangila Habibpur	20.27	20	3	36	36	3	
73.	Tangon Valley	13.60	14	3	77	77	-	
	Total	572.82	573	173	629	629	58	
	Grand Total	11620	10989	5122	5793	4106	1011	

B. NEW MAJOR SCHEMES OF VII PLAN

Rs. Crores/th.ha

Sl. No.	Name of Projects	FINANCIAL		PHYSICAL		Remarks
		Esti. Cost.	Outlay in VII Plan	Ulti-pot.	Pot. targetted for VII Plan	
	ANDHRA PRADESH					
1.	Inchampalli	362.00	20	121	-	
2.	Bhima	180.00		81	-	
3.	Thotapalli Res.	150.00		92	-	
4.	Reservoir in Gundiakamma	90.00		40	-	
5.	Gundlakalam Res. & Belaning Res.	126.00		57	-	
6.	Pulichintala	150.00		-	-	
7.	Sriramsagar St.IX	400.00	100	240	-	
8.	Srisailam L.B.C.	314.00	150	121	-	
	Total	1772.00	270	752	-	
	ASSAM					
	BIHAR					
	Unidentified Schemes	-	50	-	-	
	HARYANA					
	Kishau Dam (IS)	400.00	20	162	-	
9.	Ladua Irrigation	4.00	4	-	-	
10.	Ganga Yamuna Link	102.00	40	202	-	
11.	Nalvi Irrigation	20.00	20	-	-	
12.	Linking Power DML to Lift Canal	130.00	100	-	-	
	Total	656.00	134	364	-	
	HIMACHAL PRADESH					
13.	Shahnahar Project	13.00	5	-	-	
	KARNATAKA					
	MADHYA PRADESH					
14.	Omkareshwar	483.00	20	129	-	
15.	Ponch Diversion	187.00	50	86		
	Total	670.00	70	215	-	

1	2	3	4	5	6	7
	MAHARASHTRA					
16.	Haman	39.97	35	36	-	
	Unidentified Schemes	-	50	-	-	
17.	Krishna Koyna Lift Scheme	82.97	50	36	-	
	Total	122.94	135	72	-	
	MANIPUR					
18.	Khuga	).00	30	15	15	
19.	Chapiki	30.00				
20.	Iril Dam	29.00				
21.	Sekmai Dam	20.00	40	39	12	
22.	Baiak Dam	30.00				
	Total	139.00	70	54	27	
	ORISSA					
23.	2nd Dam in Mahanadi	-	20		-	
	Unidentified Schemes	-	5		-	
	Total	-	25		-	
	PUNJAB					
24.	Lining of Channels	58.00	58	89	28	
25.	Constn. of Low Dam & other Irrgn.works in other water sheds in Kandi area.	23.00	23	-	3	
26.	Providing Irrigation facilities to areas of erstwhile Malorkotla	4.00	4	17	17	
27.	Lining of Channels Ph.II	474.00	150	-	-	
28.	Providing Irrgn. facilities to Punjab areas under S.J.L. Project	87.00	87	129	129	
29.	Contn. of Doon Canal Right Side of River Sutlej	10.00	10	12	12	
30.	Extn. & Improvement of Shahnahar Canal	40.00	31	51	12	
	Total	696.00	363	298	201	

1	2	3	4	5	6	7
	RAJASTHAN					
31.	Brahmani	-	5	-	-	
	Unidentified Schemes		250	-	-	
32.	Dholpur Lift	25.26	25	15	15	
33.	Pipalda Lift	9.00	9	15	-	
	Total	34.26	289	30	15	
	TAMIL NADU					
34.	Nallar Project	30.00	10	7	-	
35.	Anamalaiyar	20.00	10			
36.	Modernisation of Periyar Vaigai St.II	44.00	42	-	12	
	Total	94.00	62	7	12	
	UTTAR PRADESH					
37.	Eastern Ramganga Reservoir	300.00		NI		
38.	Chamgad Dam	N.A.		NI		
39.	Lining of Ramganga Feeder	100.00		NI		
40.	Greater Gangan Dam	25.00		NI		
41.	Jhoro Escape					
42.	Garra Barrage Canals	25.00				
43.	Sandak Canal Ph.II	30.00	-	60	30	
44.	Greater Gangau Dam (U.P.Share)	25.00	-	-	-	
45.	Panchnad Dam	600.00	-	-	-	
46.	Madhya Ganga Canal St.II	225.00	160			
47.	Augmentations Tubewells - Kishau Dam (IS)	50.00		40	40	
	Total	1380.00	160	100	70	
	WEST BENGAL					
48.	Doland Irrgn. Schemes	18.00	2	22	22	
	Grand Total	6977.00	1685	2194	347	

NI - Not Indicated.

Annexure XV (Contd.)

C. ON-GOING MEDIUM SCHEMES OF VII PLAN

Rs.Crores/th.ha.

Sl.	Name of State	No. of Schemes	Esti Cost.	OUTLAY		Ult. Pot.	POTENTIAL		Remarks
				Spill-over cost	Outlay in VII Plan		Balance Pot.	Pot. targetted for VII Plan	
1.	Andhra Pradesh	44	468	309	101	264	171	110	
2.	Assam	12	86	49	49	140	100	100	
3.	Bihar	25	322	198	198	177	118	118	
4.	Gujarat	88	662	296	296	286	182	152	
5.	Haryana	2	6	2	2	42	8	8	
6.	Himachal Pradesh	5	20	18	10	13	13	7	
7.	Jammu & Kashmir	30	164	126	72	39	15	15	
8.	Karnataka	23	143	65	65	53	48	48	
9.	Kerala	5	146	138	127	61	61	-	
10.	Madhya Pradesh	39	396	245	245	249	229	229	
11.	Maharashtra	147	750	425	396	523	393	222	
12.	Manipur	3	13	1	1	15	3	3	
13.	Meghalaya	-	-	-	-	-	-	-	
14.	Nagaland	-	-	-	-	-	-	-	
15.	Orissa	40	631	433	327	352	255	120	
16.	Punjab	5	27	42	42	113	53	43	
17.	Rajasthan	16	195	103	103	114	90	90	
18.	Sikkim	-	-	-	-	-	-	-	
19.	Tamil Nadu	11	95	59	59	29	26	24	
20.	Tripura	3	27	32	32	20	20	20	
21.	Uttar Pradesh	19	74	49	24	113	85	85	
22.	West Bengal	21	42	17	17	52	17	35	
	Total States	538	4268	2607	2256	2640	1887	1429	
	Union Territories	2	26	17	17	8	7	7	
	Total All India:	540	4294	2624	2273	2648	1894	1436	

Annexure XV (Contd.)

D. NEW MEDIUM SCHEMES OF VII PLAN

Sl. No.	Name of States	No. of Schemes	FINANCIAL		PHYSICAL		Remarks
			Esti. Cost.	Outlay in VII Plan	Ult. Pot.	Pot. targeted for VII Plan	
1.	Andhra Pradesh	17	148	20.00	94	-	
2.	Assam	-	327	160.81	-	-	
3.	Bihar	14	138	138.22	56	46.00	
4.	Gujarat	10	150	150.00	154	60.00	
5.	Haryana	-	-	-	-	-	
6.	Himachal Pradesh	-	-	14.00	-	-	
7.	Jammu & Kashmir	-	-	16.00		-	
8.	Karnataka	-	-	20.00	-	-	
9.	Kerala	-	-	-	-	-	
10.	Madhya Pradesh	14	185	100.00	96	16.00	
11.	Maharashtra	-	-	50.00	-	-	
12.	Manipur	-	-	-	-	-	
13.	Meghalaya	-	-	-	-	-	
14.	Nagaland	-	-	-	-	-	
15.	Orissa	2	25	25.00	-	-	
16.	Punjab	1	-	0.13	-	-	
17.	Rajasthan	-	-	50.00	-	-	
18.	Sikkim	-	-	-	-	-	
19.	Tamil Nadu	8	72	47.00	-	5.00	
20.	Tripura	-	-	-	-	-	
21.	Uttar Pradesh	10	23	22.00	-	-	
22.	West Bengal	8	17	17.40	24	24.00	
	Total States	84*		830.56		151.00	
	Union Territories	-	-	-	-	-	
	Total: All India	84		830.56		151.00	

*Excluding projects of Assam to be finalised.

Annexure-XV (Contd.)

E. SCHEMES OF MODERNISATION, ETC.

(Rs. Crores/th.ha.)

S. No.	Name of State	Esti. cost	FINANCIAL		PHYSICAL		Pot.targeted for VII Plan
			Spill-Over cost	out-lay in VII Plan	Ulti. pot.	Balance pot.	
1.	Andhra Pradesh	310.01	309	60.00	940	940	30
2.	Assam	-	-	11.00	-	-	-
3.	Bihar	1064.00	1000	338.00	195	195	5
4.	Gujarat		150.00	150.00	154	154	22
5.	Haryana	250.00	133.00	133.00	378	261	150
6.	Himachal Pradesh	-	-	-	-	-	-
7.	Jammu & Kashmir	3.00	3.00	3.00	-	-	-
8.	Karnataka	25.00	25.00	25.00	-	-	-
9.	Kerala	25.00	25.00	25.00	-	-	-
10.	Madhya Pradesh	75.00	75.00	50.00	-	132	82
11.	Maharashtra	15 00	1.00	1.00	4	3	-
12.	Manipur	-	-	-	-	-	-
13.	Maghalaya	-	-	-	-	-	-
14.	Nagaland	-	-	-	-	-	-
15.	Orissa	94.00	92.00	47.00	-	-	-
16.	Punjab	8.00	8.00	8.00	-	-	-
17.	Rajasthan	185.00	185.00	120.00	-	-	-
18.	Sikkim	-	-	-	-	-	-
19.	Tamil Nadu	578.00	558.00	135.00	-	-	5
20.	Tripura	-	-	-	-	-	-
21.	Uttar Pradesh	171.00	166.00	166.00	148	77	43
22.	West Bengal	394.00	387.00	86.00	92	92	20
	Total States	3177.00	3177.00	1358.00	1911	1854	357

Annexure-XV (Contd.)

F. FIELD CHANNELS, WATER COURSES AND CONJUNCTIVE USE

(Rs. Crores/th.ha.)

Sl. No.	Name of State	Outlay in 7th Plan	Remarks
1.	Andhra Pradesh	55.00	-
2.	Assam	3.00	-
3.	Bihar	12.00	-
4.	Gujarat	65.00	-
5.	Haryana	27.00	-
6.	Himachal Pradesh	-	-
7.	Jammu and Kashmir	-	-
8.	Karnataka	25.00	-
9.	Kerala	30.00	-
10.	Madhya Pradesh	25.00	-
11.	Maharashtra	50.00	-
12.	Manipur	-	-
13.	Meghalaya	-	-
14.	Nagaland	-	-
15.	Orissa	15.00	-
16.	Punjab	-	-
17.	Rajasthan	15.00	-
18.	Sikkim	10.00	-
19.	Tamil Nadu	-	-
20.	Tripura	-	-
21.	Uttar Pradesh	96.00	-
22.	West Bengal	5.00	-
	Total States:	433.00	-

Note: It is anticipated that an additional potential of 131 th. ha. in U.P. and 3 th. ha. in West Bengal would be created by these schemes.

Annexure-XV (Contd.)

G. WATER DEVELOPMENT

(Rs.Crores/th.ha.)

Sl. No.	Name of State	Outlay in VII Plan	Remarks
1.	Andhra Pradesh	45.00	-
2.	Assam	6.70	-
3.	Bihar	70.00	-
4.	Gujarat	95.00	-
5.	Haryana	1.00	-
6.	Himachal Pradesh	1.00	-
7.	Jammu and Kashmir	5.00	-
8.	Karnataka	35.00	-
9.	Kerala	25.00	-
10.	Madhya Pradesh	109.00	-
11.	Maharashtra	90.00	-
12.	Manipur	4.00	-
13.	Meghalaya	-	-
14.	Nagaland	-	-
15.	Orissa	35.00	-
16.	Punjab	9.00	-
17.	Rajasthan	15.00	-
18.	Sikkim	-	-
19.	Tamil Nadu	30.00	-
20.	Tripura	2.00	-
21.	Uttar Pradesh	82.00	-
22.	West Bengal	26.00	-
	Total States:	687.00	-

Annexure-XVI

LAG IN UTILISATION

(Th. Ha.)

Sl. No.	Name of State	Actual Pot. Created by 6/83	Utl. by 6/83	Lag.	% age	Pot. likely by 6/84	Ulti-likely by 6/84	Lag.	% age
1.	Andhra Pradesh	3188	2756	432	86.4	3286	2854	432	86.9
2.	Assam	117	59	58	50.4	125	65	60	52.0
3.	Bihar	2696	1965	731	72.9	2786	2065	721	74.1
4.	Gujarat	1159	663	496	37.2	1239	738	501	59.6
5.	Haryana	1856	1700	156	91.6	1891	1719	172	90.9
6.	Himachal Pradesh	5	3	2	60.6	6	4	2	66.7
7.	Jammu & Kashmir	173	154	19	89.0	196	178	18	90.8
8.	Karnataka	1153	1081	72	93.8	1227	1143	84	93.1
9.	Kerala	508	487	21	95.9	547	527	20	96.3
10.	Madhya Pradesh	1673	1179	494	70.5	1721	1249	472	72.6
11.	Maharashtra	1520	781	739	51.4	1657	973	684	58.7
12.	Manipur	25	15	10	50.0	31	18	13	58.1
13.	Meghalaya	-	-	-	-	-	-	-	-
14.	Nagaland	-	-	-	-	-	-	-	-
15.	Orissa	1515	1473	42	92.7	1548	1489	59	96.2
16.	Punjab	2418	2404	14	99.4	2449	2427	22	99.1
17.	Rajasthan	1617	1429	188	88.4	1748	1481	262	85.0
18.	Sikkim	-	-	-	-	-	-	-	-
19.	Tamil Nadu	1210	1184	26	97.9	1224	1209	15	98.8
20.	Tripura	-	-	-	-	-	-	-	-
21.	Uttar Pradesh	6723	5234	1489	77.9	6778	5396	1382	79.6
22.	West Bengal	1542	1433	109	92.9	1564	1453	111	92.9
	Total States:	29098	24000	5098	82.5	30017	24926	5091	83.0
	Union Territories	19	13	6	68.4	19	13	6	68.4
	Total All India	29117	24013	5104	82.5	30036	24939	5097	83.0

Annexure-XVII

LIST OF MAJOR PROJECTS WHICH ACCOUNT FOR MAJOR LAG IN UTILISATION

(Th. ha.)

Sl. No.	Name of State/Project	Pot. Anti. by 6/83	Ulti. Anti. by 6/83	% Age	Lag in Utilisation
1	2	3	4	5	6
	ANDHRA PRADESH				
1.	Nagarjunasagar	707	542	76.7	165
2.	Sriram Sagar	223	133	59.6	90
	BIHAR				
3.	Gandak	890	580	65.2	310
4.	Eastern Kosi Canal	372	185	49.7	187
5.	Rajpur Canal	124	55	44.4	69
6	Sone H.I.C.	160	117	73.1	43
	GUJARAT				
7.	Ukai	153	38	24.8	115
8.	Mahi St-I	261	135	57.7	126
9.	Kadana	13	8	61.5	5
10.	Kakrapar	227	153	67.4	74
11.	Sabarmati	48	13	27.1	35
12.	Panam	47	13	27.1	34
	HARYANA				
13.	J.L.N. Lift Canal	56	18	32.1	38
14.	Loharu	57	11	19.3	46
15.	Sewani	43	13	30.2	30
16.	Gurgaon Canal	60	15	25.0	45
	MADHYA PRADESH				
17.	Chambal	273	125	45.8	148
18.	Tawa	250	67	26.8	183
19.	Barna	61	24	29.2	37
20.	Sukta	17	2	11.8	15
21.	Rajwan	13	3	23.1	10
22.	Sindh Ph. I	32	20	62.5	12

1	2	3	4	5	6
23.	Halali	24	7	29.2	17
24.	Pairy	51	32	62.7	19
	MAHARASHTRA				
25.	Upper Godavari	54	19	35.2	35
26.	Upper Tapi St. I	16	4	25.0	12
27.	Khadakwasla	37	9	24.3	28
28.	Krishna	53	8	15.1	45
29.	Jayakwadi St. I	137	45	32.8	92
30.	Kukadi	25	4	16.6	21
31.	Bhima	54	15	27.8	39
32.	Upper Penganga	8	-	-	8
33.	Manjra	21	5	23.8	15
34.	Pench	45	3	6.7	42
35.	Jayakwadi St. II	29	9	31.0	20
	MANIPUR				
36.	Loktak	19	11	57.9	8
	RAJASTHAN				
37.	Rajasthan Canal St.I	560	420	75.0	140
38.	Rajasthan Canal St. II	46	10	21.7	36
39.	Gurgaon Canal	17	-	-	17
	TAMIL NADU				
40.	Chittarpattanamkal	15	7	46.7	8
	UTTAR PRADESH				
41.	Ramganga	591	462	78.2	29
42.	Sarda Sahayak	1526	590	38.7	936
43.	Adwa	17	9	52.9	8
44.	East Baigul	15	4	26.7	11
45.	Dohrighat Sahayak	46	12	26.1	34
46.	Parallellover Ganga Canal	90	10	11.1	80
47.	Jamrani	21	5	23.8	16
48.	Suhali	18	2	11.1	16

Annexure-XVIII

PROPOSED OUTLAYS AND TARGETS FOR VII PLAN

Rs. Crores/th. ha.

Sl. No.	Name of State	Outlay	Targets of Potential
1.	Andhra Pradesh	2159	500
2.	Assam	301	181
3.	Bihar	2529	587
4.	Gujarat	2277	340
5.	Haryana	623	420
6.	Himachal Pradesh	30	6
7.	Jammu & Kashmir	96	15
8.	Karnataka	920	260
9.	Kerala	473	105
10.	Madhya Pradesh	3044	1070
11.	Maharashtra	09	680
12.	Manipur	147	70
13.	Meghalaya	-	-
14.	Nagaland	-	-
15.	Orissa	1215	275
16.	Punjab	542	265
17.	Rajasthan	1123	670
18.	Sikkim	-	-
19.	Tamil Nadu	357	45
20.	Tripura	35	15
21.	Uttar Pradesh	2230	600
22.	West Bengal	600	345
	Total	21409	6449
	Union Territories	128	16
	Total All India	21537	6465 Say 6.5 M.ha.
	Central Sector Total:	912	
		22449 Say 22450 Crores.	

As per States' proposals a potential of 8.045 M. ha. was indicated as target for VII Plan. However in keeping with previous performance the Working Group has fixed a target of 6.5 M. ha. during vil plan